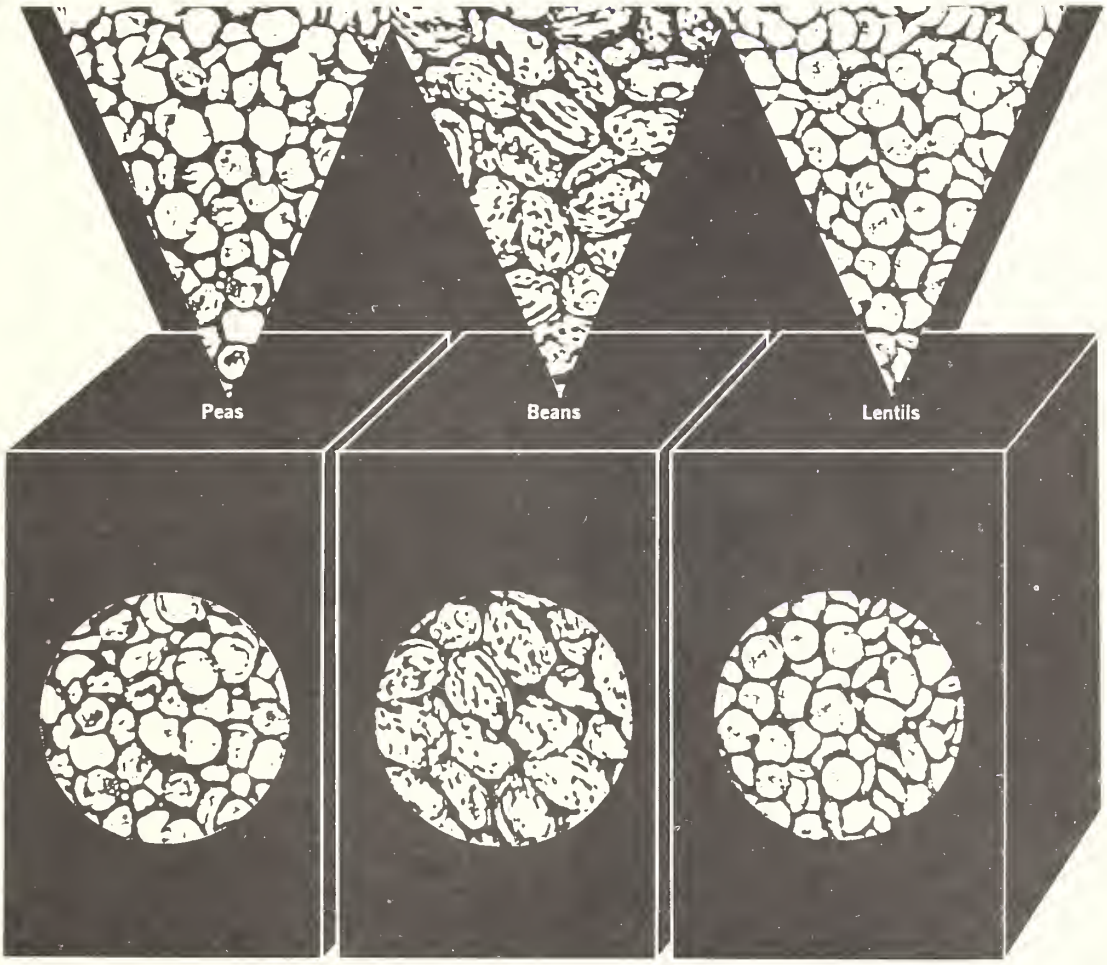
Future Role of Cooperatives in Marketing Beans, Peas, and Lentils



United States Department of Agriculture

Economics, Statistics, and Cooperatives Service

Farmer Cooperative Research Report No. 16

FUTURE ROLE OF COOPERATIVES IN MARKETING BEANS, PEAS, AND LENTILS. By Art Smith, Cooperative Marketing and Purchasing Division; Economics, Statistics, and Cooperatives Service; U.S. Department of Agriculture. Farmer Cooperative Research Report No. 16.

ABSTRACT

Pulse production in the United States has become geographically specific and concentrated, and the marketing channels for pulses have changed dramatically over the past 30 years. The most marked change has been the growth of large proprietary marketing firms which are vertically integrated as national packagers and exporters, and procure directly from pulse producers through their own elevators. Farmer cooperatives as a whole have been unable to effectively countervail this growth in market concentration. Cooperatives do, however, have the potential to counteract their competition's position by pooling pulses, merging regional marketing agencies into a single national cooperative marketing agency in common, and/or by packaging, canning and exporting pulses themselves.

Key words: pulses, vertical integration, cooperatives, dry edible beans, lentils

Washington, D.C. 20250 March 1980

CONTENTS

SUMMARY

Farmer cooperatives must adapt to new market trends if they are to compete effectively with private firms in marketing U.S. pulses. This report examines the U.S. pulse industry's trends and the ways in which cooperatives can strengthen their marketing efforts.

Cooperatives can compete with the vertically integrated packager-exporter by merchandising and exporting pulses themselves. Cooperatives will have to establish overseas sales offices and acquire current market information in order to export competitively.

Cooperative members may counteract growth of large private packagers by pooling growers' pulses. This allows for both a reduction in marketing risks and potentially higher prices for the grower.

Cooperatives may also form a single marketing agency in common, enabling the regional cooperatives to join together as a stronger presence in the marketplace. Such an organization may act as a single trader and can market a full line of pulses as competitors do.

Future Role of Cooperatives in Marketing Beans, Peas, and Lentils

*Art Smith**

INTRODUCTION

This report gives pulse producers current information about the industry and recommends how they can improve their position in the marketplace via cooperative organization. The last such industrywide study on pulses was published in 1951.

PULSE PRODUCTION

The value of U.S. pulse production--dry edible beans, peas, and lentils--has amounted to approximately $390 million a year for the past 5 years (1973-78). Though pulses represent only about .8 percent of total farm income derived from crops, they are important to the few States in which they are produced. Michigan derives 10 percent of its farm income from pulses, Idaho over 6 percent, and Colorado about 5 percent.

Total pulse production in the major pulse producing States dropped from 21.2 million cwt. during 1957-68 to 20.9 million during 1967-78, or about 1.3 percent, (table 1). Michigan, Idaho, California, and Washington maintained their relative ranks between the two periods. Oregon and New Mexico completely dropped out of the picture, while North Dakota and Minnesota increased production by over 300 percent. Ten States now produce more than 98 percent of the total U.S. pulses.

While total production has not changed significantly in the past 20 years, the number and size of pulse producing farms have changed. In 1964, approximately 30,000 farms averaging 56 acres per farm produced pulses. In 1974, the number of farms had declined by a third and average farm size increased by about 60 percent to 88 acres per farm (appendix table 1).

Yield per acre for dry edible beans increased by over 50 percent since the late thirties (appendix table 2). While the number of farms declined during this period by over 80 percent, acreage was cut back by only 15 percent. Yield increases are attributed to improved cultural practices and the increased proportion of acreage under irrigation. In the past 20 years, however, there has been no appreciable change in yields.

Navy and pinto beans account for half of all pulses produced in the United States, according to the ranking of the 16 most important pulse classes and their average production during 1967-78 (table 2). Peas and lentils comprise only 17 percent of total pulse production with dry edible beans making up the remaining 83 percent.

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Table 1--Pulse producing States, rank and average production, 1957-68 and 1967-78

State	Rank		Production	
	1957-68	1967-78	1957-68	1967-78
			1,000 cwt.	
Michigan	1	1	6,662	6,025
Idaho	2	2	3,278	3,373
California	3	3	2,873	2,757
Washington	4	4	2,533	2,715
Colorado	5	6	1,829	1,714
Nebraska	6	5	1,208	1,746
New York	7	8	1,116	558
Wyoming	8	9	821	473
Montana	9	11	206	151
North Dakota	10	7	167	803
Kansas	11	12	149	146
Oregon	12	NA	135	0
Minnesota	13	10	90	375
New Mexico	14	NA	63	0
Utah	15	13	43	57

NA = not applicable.

Table 2--U.S. pulse production, by class and average production, 1967-78

Class	Production
	1,000 cwt.
Navy bean	5,498
Pinto bean	5,067
Green pea	2,125
Great northern bean	1,645
Red kidney bean	1,302
Lentils	889
Pink bean	759
Blackeye bean	691
Yellow pea	578
Large lima bean	574
Baby lima bean	434
Small red bean	396
Small white bean	366
Cranberry bean	211
Black turtle bean	202
Garbanzo bean	79

Pulse Producing Areas

Although 13 States produce pulses, the delineation of producing areas is not based on State boundaries but on similarity in weather conditions and cultural practices.

Dry pulses are produced in eight distinct areas--New York, Michigan, North Dakota-Minnesota, Northeast Colorado-Wyoming-Nebraska-Kansas, Southwest Colorado-Utah, Idaho-Montana, Northwest Idaho-Washington, and California.

The New York area produces red kidney and black turtle soup beans. Production in this area is declining steadily at a rate of about 60,000 cwt. yearly. New York's 1967 production of red kidneys was 673,000 cwt. and black turtles was 241,000 cwt., compared to 315,000 and 57,000 cwt., respectively, in 1978. Red kidney production declined by over 50 percent and black turtles by 75 percent during 1967-78; it does not appear that these trends will abate.

The Michigan area produces navy, dark red kidneys, black turtle soup, and cranberry beans. The production of navy and kidney beans has been rather stable during the past decade. Black turtle production has averaged close to 60,000 cwt. a year since being introduced in 1974. Cranberry bean production has been increasing at a rate of 18,000 cwt. a year. Total area production is close to 6 million cwt., with navy beans comprising 90 percent of the total. Navy beans will continue to be the predominant pulse grown in Michigan with production remaining relatively stable.

North Dakota-Minnesota, or the Red River Valley area, produces pinto, navy, and great northern beans. Pinto production has increased by over 300 percent during the past decade, at a rate of about 50,000 cwt. a year. Likewise, navy bean production has also been increasing an average of 54,000 cwt. yearly. Great northern production is very minor, averaging only 8,000 cwt. a year. It appears that this area's production will continue to increase, but certainly by less than the past 10-year trend would indicate. Production should be rather stable in the future, since the tremendous growth in the early years of production has now stabilized somewhat.

The Northeast Colorado-Wyoming-Nebraska-Kansas area produces pinto and great northern beans. Only pinto beans are produced in Colorado and Kansas, while Wyoming and Nebraska produce both pintos and great northerns. The area's bean production is irrigated, either by gravity flow or center pivot sprinkler. In 1977, this area produced 2,162,000 cwt. of pintos and 1,039,000 cwt. of great northerns. This was 48 percent of the total U.S. pinto and 72 percent of the total U.S. great northern production.

The Southwest Colorado-Utah area produces only pintos, averaging about 400,000 cwt. a year during the past decade. Production in this area is declining by 50,000 cwt. per year. Pintos are grown under dry land conditions and thus have relatively low yields--5 cwt. per acre compared to 16 cwt. in northeast Colorado. Production is extremely volatile, due to a total dependence on variable weather conditions.

The southern part of Idaho produces pinto, great northern, red kidney, pink, and small red beans. Idaho's pinto production is 19 percent of the U.S. total and increasing at a yearly rate of 28,000 cwt. Approximately 23 percent of the U.S. great northerns are produced there, and production is growing by 16,000 cwt. a year. Two-thirds of the pink beans are produced in Idaho, with increasing annual production of 28,000 cwt. Idaho also produces over 50 percent of all small reds.

The Washington-Northeast Idaho area is the sole producer of green and yellow peas and lentils, and also produces small red and small white beans. This area produces less than 10 percent of the small whites, but production is growing gradually by 5,000 cwt. per year.

California produces more classes of pulses than any other area. The total U.S. volume of large lima, baby lima, blackeyes, and garbanzos is produced here. California also produces about 85 percent of all small whites, 20 percent of all pinks, and 40 percent of all red kidneys. Large lima production has been declining by 27,000 cwt. a year and small whites by 22,000 cwt. Red kidney production has increased by 50,000 cwt. per year, and more than offset the decline in large limas and small whites. Thus, total pulse production in California is rather constant.

The U.S. production of pulses produced primarily in a single area (such as large and baby limas, blackeyes, garbanzos, peas, lentils, and navy beans) depends to a large degree on the prevailing weather. There tends to be perfect correlation of the yields in those specialized areas with the U.S. average yield of that particular pulse class. However, the opposite is true for those pulses produced in several areas.

A bad production year for pintos in Idaho does not necessarily mean poor production in Colorado or North Dakota. The same holds true for black turtle production between Michigan and New York, or the red kidney production areas. Pink bean yields may be average in Idaho, with a bumper crop in California. Thus, the yield of a pulse crop in one producing area is independent of yields in another.

Within-area pulse yields are correlated; for example, pinto, great northern, and pink bean yields are correlated in Washington-Northern Idaho. Thus, when an area has a bad year, it means low yields for all pulses produced there.

Navy Beans

Navy beans are produced in Michigan, Minnesota, and North Dakota, with an average yearly U.S. production of about 5.5 million cwt. Michigan dominates total production with a 96-percent share, while the Minnesota and North Dakota area (Red River Valley) produces the remaining 4 percent (fig. 1).

There has been no trend in U.S. production of navy beans. On the average, annual U.S. production falls within 17 percent of the mean of 5.5 million cwt. North Dakota, however, has shown an increasing production of 54,000 cwt. a year since its initial reporting in 1974. This increase has been such a small portion of the total, however, that it has had little impact on the total U.S. production.

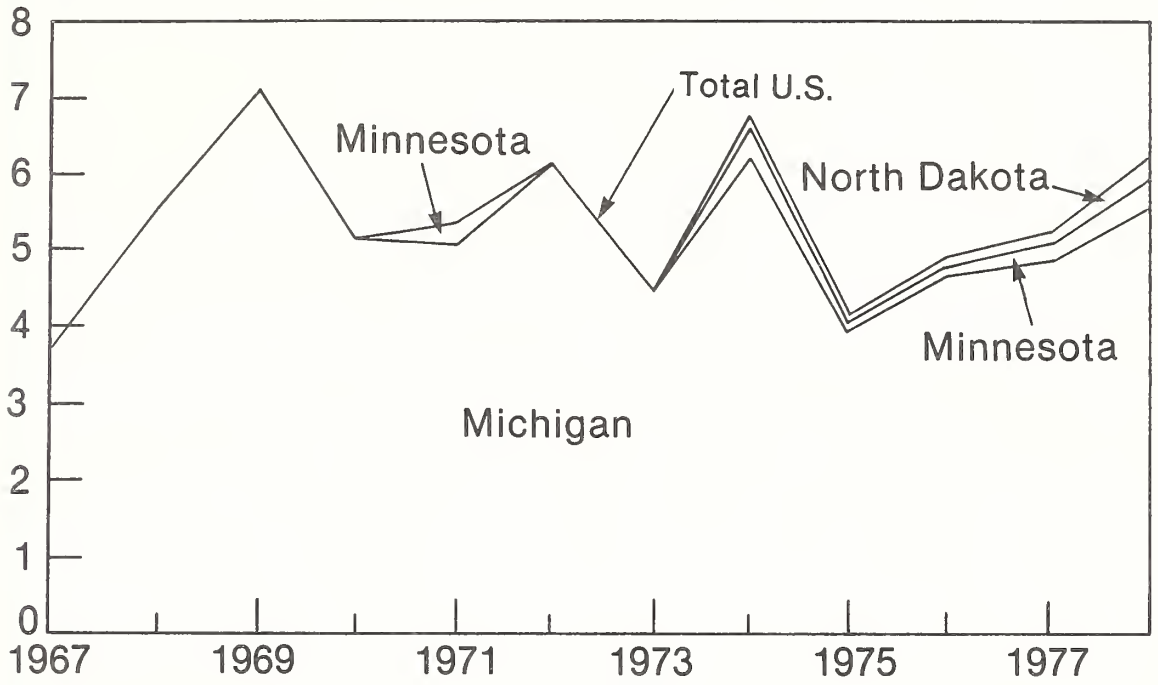
The market for navy beans is both domestic and export. Exports have averaged about 1.3 million cwt. a year, or 23 percent of total production. In 1977, exports accounted for 32 percent of the total market.

Domestically, navy beans are used primarily for canning, with pork and beans, baked beans, and beans in tomato sauce the principal products. Only a very small quantity of the beans are sold at the retail level in their natural form (dry), well less than 10 percent of the total.

The primary export market for navies has been Europe, with the United Kingdom the predominant customer. Though the beans are exported in their natural form, they are ultimately used for canning. The between year variation in exports has been greater than the between year variation in U.S. production (appendix tables 3, 4, and 5). This export variability is due to Canadian competition and their highly volatile production.

Figure 1

Total U.S. Production of Navy (Pea) Beans, by State, 1967-78



Pinto Beans

Pintos are produced in 11 States and are second only to navy beans in production. The average yearly U.S. production exceeds 5 million cwt., with a trend toward increasing production by approximately 95,000 cwt. annually. Colorado is the leading producing State with over 30 percent of the total U.S. production. Idaho and North Dakota follow, each with 18 percent of the total. Nebraska with a share of 12 percent has the fourth largest production; the remaining 22 percent is produced by Wyoming, Minnesota, Kansas, Montana, Michigan, Washington, and Utah (fig. 2).

Colorado's production has been declining at a rate of 50,000 cwt. a year, Wyoming by 11,000 cwt., and Utah by 5,000 cwt. The growth States have been North Dakota, increasing an average of 84,000 cwt. a year; Nebraska and Idaho each at a rate of 28,500 cwt. a year; Minnesota at 20,000 cwt.; and Washington at 13,500 cwt. Production in Kansas, Montana, and Michigan remained relatively stable.

Pintos are marketed both domestically and abroad. With the growing popularity of Mexican food and the increased population of Latin Americans, the domestic market for pintos has been expanding. They are mainly sold at the retail level in dry form, canned as refried beans. Whole pinto beans are continually popular.

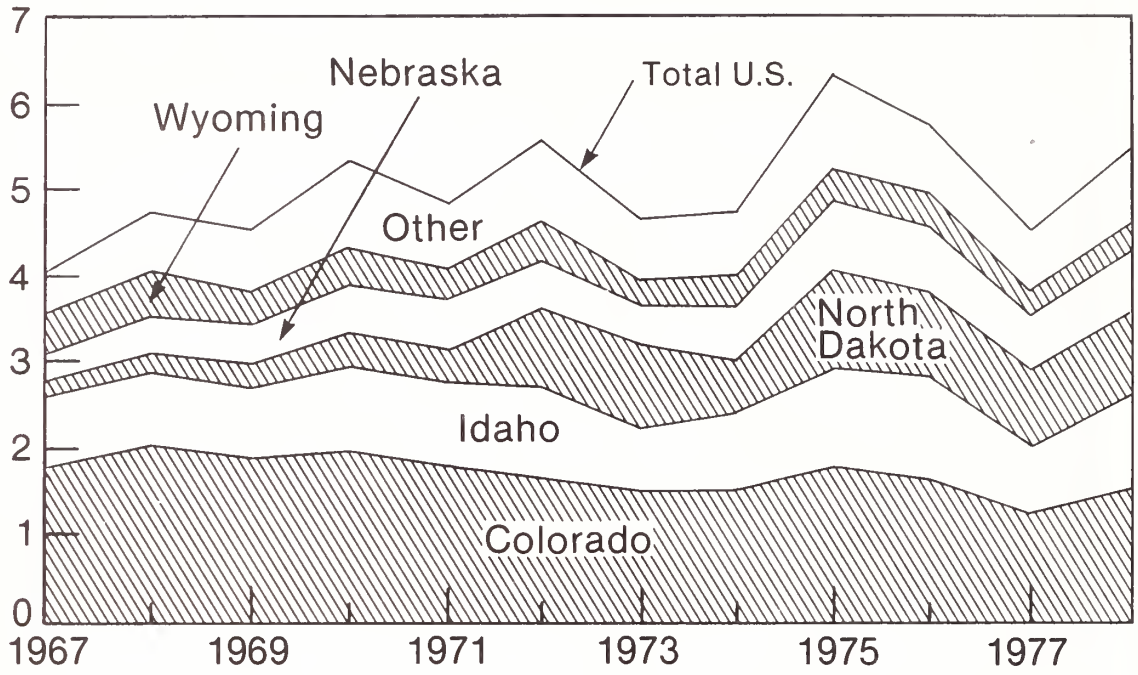
Exports of pintos have also been increasing, averaging over 520,000 cwt. a year, or 10.5 percent of total U.S. production. The rate of increase is over 60,000 cwt. annually, increasing by about 1 percent yearly. Mexico, the Netherlands, Iran, the Dominican Republic, and Angola have been major purchasers (appendix tables 6, 7, and 8). 1/

1/ U.S. statistics on pinto exports to the Netherlands are misleading since their final destination is not declared, such as transshipment to Cuba.

Figure 2

Total U.S. Production of Pinto Beans, by State, 1967-78

Million cwt.



Peas and Lentils

Peas (green and yellow) and lentils are produced in Washington and Idaho. Actually, this is a combined producing area which encompasses eastern Washington and northwest Idaho--the Palouse. The annual average production of green peas is in excess of 2.1 million cwt. (fig. 3), 478,000 cwt. for yellow peas (fig. 4), and 890,000 cwt. for lentils (fig. 5). Washington produces over 53 percent of the green peas, 88 percent of the yellow peas, and 75 percent of the lentils.

Pea and lentil production is very volatile, with variations of up to 33 percent from their means. Yellow pea production has been declining at a rate of about 45,000 cwt. a year due to Canadian competition.

Exports make up the predominant market for peas and lentils. Over 72 percent of U.S. lentils, 61 percent of the yellow peas, and 52 percent of the green peas are exported. Exports of both green and yellow peas have been trending downward. Green pea exports have been declining at a yearly rate of 70,000 cwt. and yellow peas by 17,000 cwt. Lentil exports tend to vary in direct relation with production. The most important export markets for green peas have been Colombia, Venezuela, the United Kingdom, Japan, and Taiwan (appendix tables 9, 10, and 11). For yellow peas, the major markets have been Colombia, Venezuela, Taiwan, and Iran (appendix tables 12, 13, and 14). Colombia, Venezuela, the Netherlands, West Germany, Algeria, and other Mediterranean countries have been important markets for lentils (appendix tables 15, 16, and 17).

Domestically, peas are sold split in dry form for traditional use in split pea soups. Lentils are also sold in their dry form.

Figure 3

Total U.S. Production of Dry Green Peas, by State, 1967-78

Million cwt.

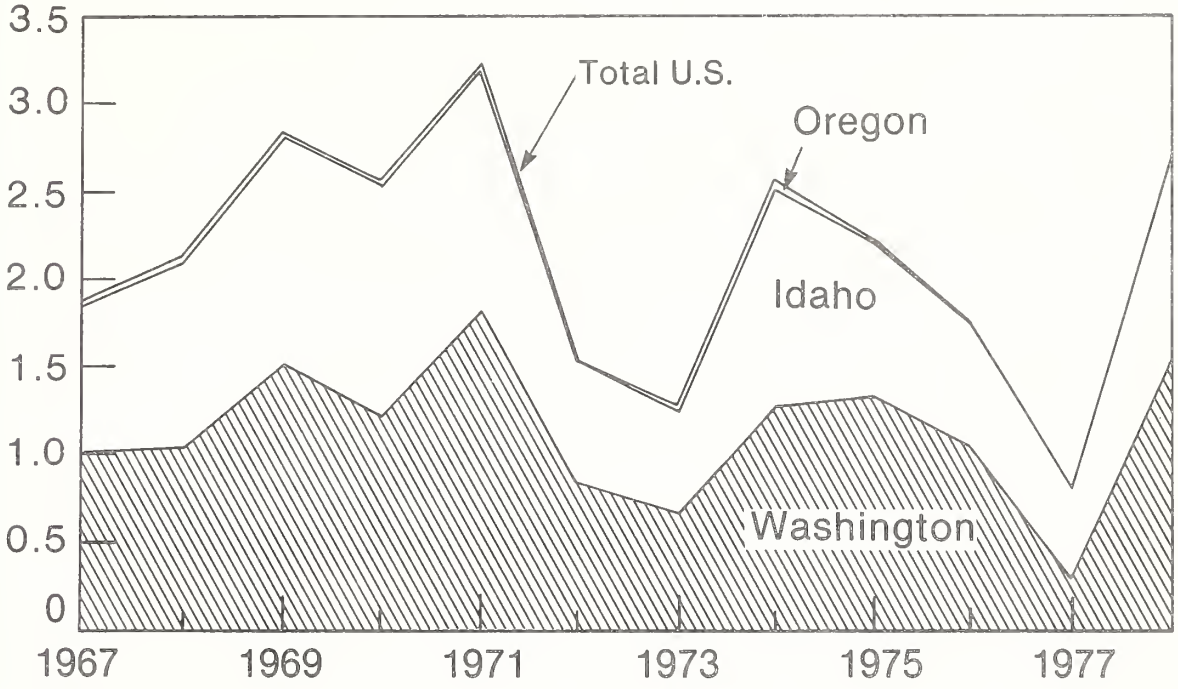


Figure 4

Total U.S. Production of Dry Yellow Peas, by State, 1967-78

1,000 cwt.

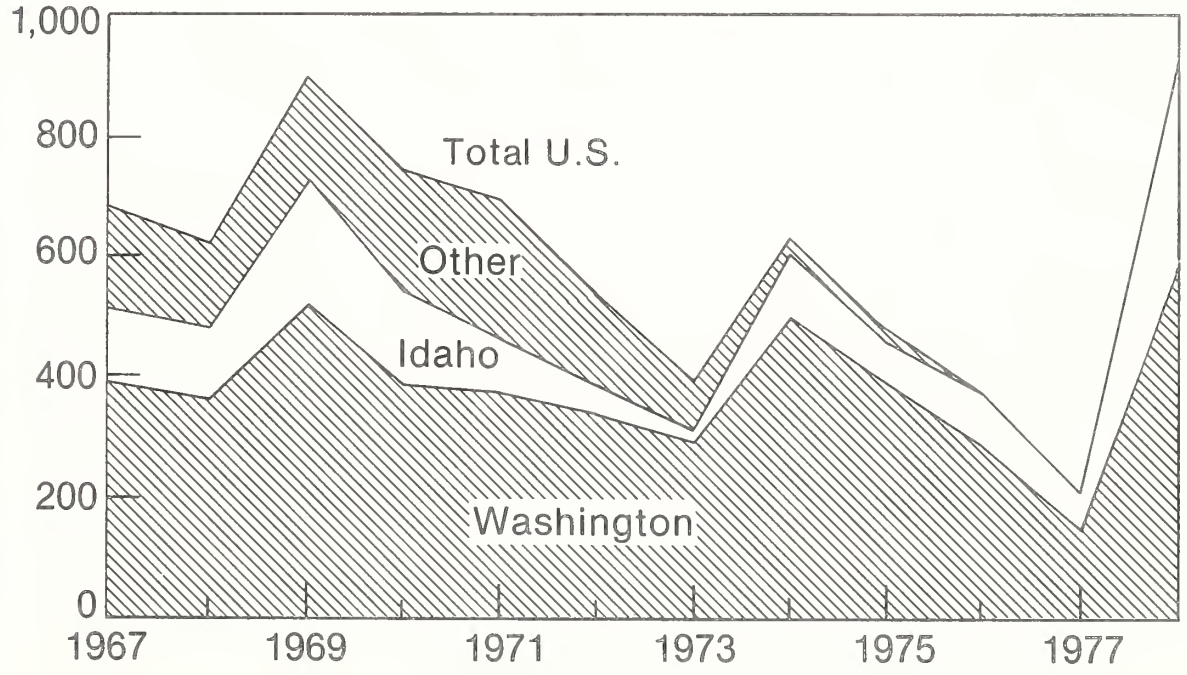
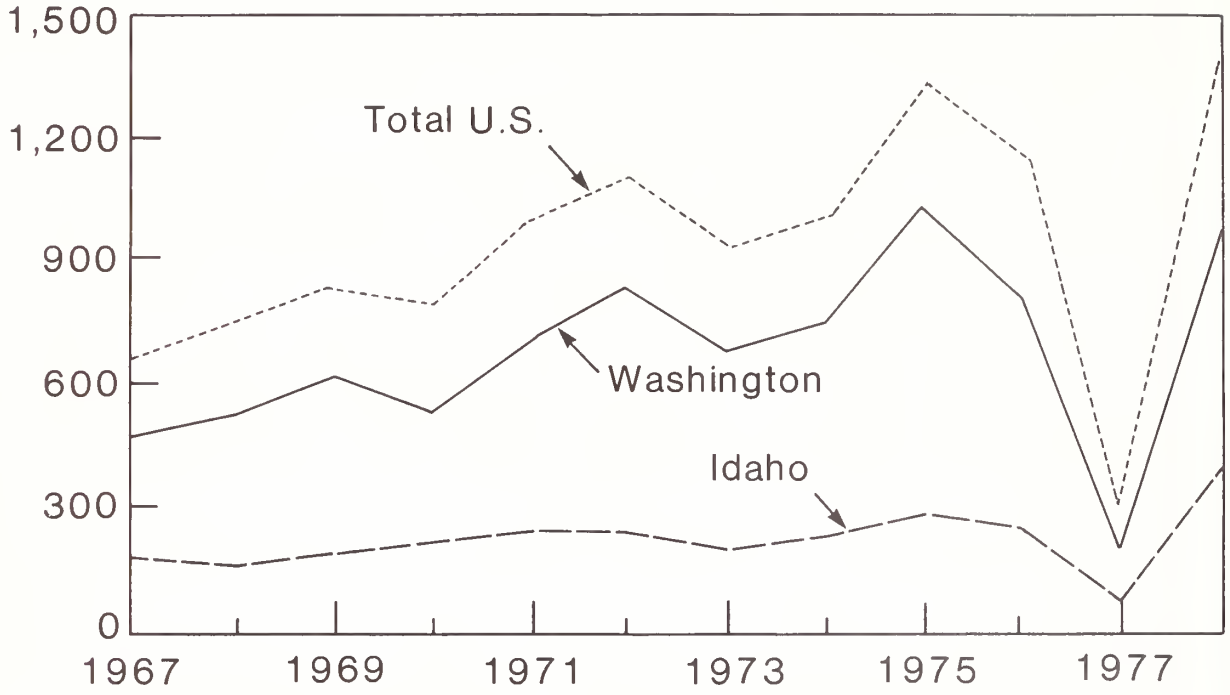


Figure 5

Total U.S. Production of Lentils, by State, 1967-78

1,000 cwt.



Great Northern Beans

Great northerns are produced in five States and are the third most important dry beans in production volume, following navies and pintos. The average yearly U.S. production is in excess of 1.6 million cwt. Nebraska leads in production with a 70-percent share of the U.S. total. Idaho produces an additional 25 percent of the total and the remaining 5 percent is represented by production from Wyoming, Montana, and North Dakota. U.S. great northern production increased in Idaho but decreased in Wyoming and Montana (fig. 6).

The market for great northerns is both domestic and export. The domestic market has been the larger of the two, although exports have been trending upward over time, accounting for 56 percent of the total market in 1978.

The domestic demand for great northerns has been stable with no increase in per capita consumption. Great northerns are mainly sold at the retail level in dry form, although canned great northerns are available.

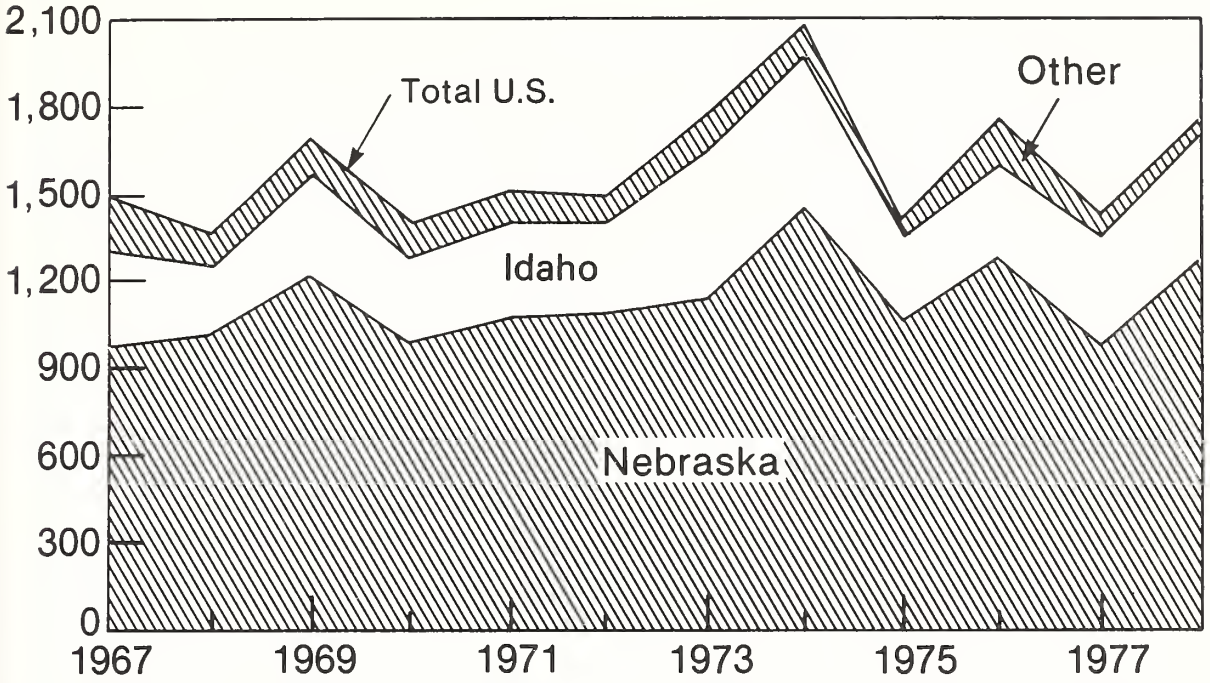
The export market has been a growing outlet for U.S. great northern production. The quantity exported has increased at an average of 47,000 cwt. annually. Algeria and France are traditionally major purchasers. Prior to 1960, Cuba was the dominant U.S. export market for great northerns (appendix tables 18, 19, and 20).

Red Kidney Beans

There are two types of red kidney beans produced in the United States: dark red and light red. The average annual production of all red kidneys has been 1.3 million cwt. California is the leading producer, predominantly of light reds, with a 39-

Figure 6

Total U.S. Production of Great Northern Beans, by State, 1967-78



percent share, or average production of 504,000 cwt. (fig. 7). New York produces 29 percent (383,000 cwt.), Michigan 24 percent (314,000 cwt.), and Idaho the remaining 8 percent (50,000 cwt.).

California has been increasing production by 53,800 cwt. a year and Idaho by 7,000 cwt. Production in New York, on the other hand, has declined steadily at 33,000 cwt. a year.

The markets for the two types of red kidneys are markedly different (appendix tables 21, 22, and 23). The light red kidney enjoys both a domestic and export market. Domestically, they are used about equally for packaging and canning, especially with meat products such as chili. For exports, they go mostly to the Latin American and Carribean market. The dark red kidney is used solely for canning purposes domestically and is normally packed in its natural juices. The dark red kidney is also exported primarily to Europe to be used in canning. In dry form, dark reds give the impression of being an old light red kidney and are thus not acceptable to many in the export market. Exports of all red kidney beans average 163,000 cwt. a year with no apparent increasing or decreasing trend.

Pink Beans

The average U.S. production of the pink bean has been 759,000 cwt. annually and is increasing by 34,000 cwt. a year (appendix tables 24 and 25). California's production averages over 150,000 cwt. a year, while Washington and Nebraska each produce about 45,800 cwt. Nebraska's production has been declining and will likely cease within the next few years. Idaho produces in excess of 500,000 cwt. a year, or two-thirds of the total (fig. 8), and production has been growing by over 28,000 cwt. a year.

Figure 7

Total U.S. Production of Red Kidney Beans, by State, 1967-78

Million cwt.

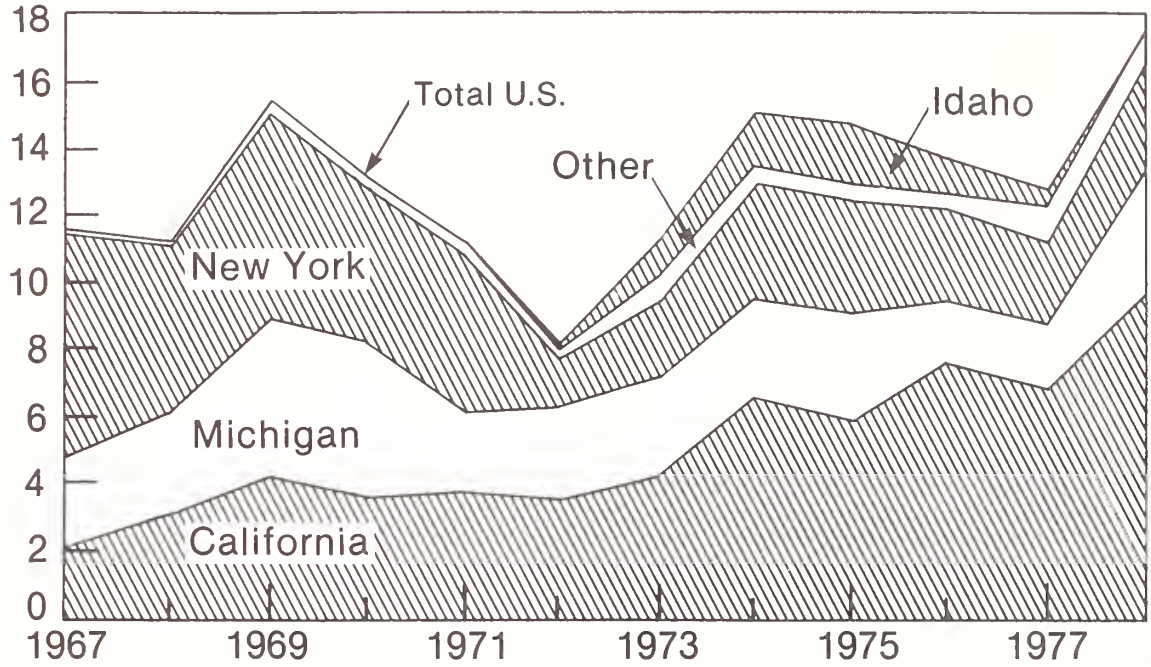
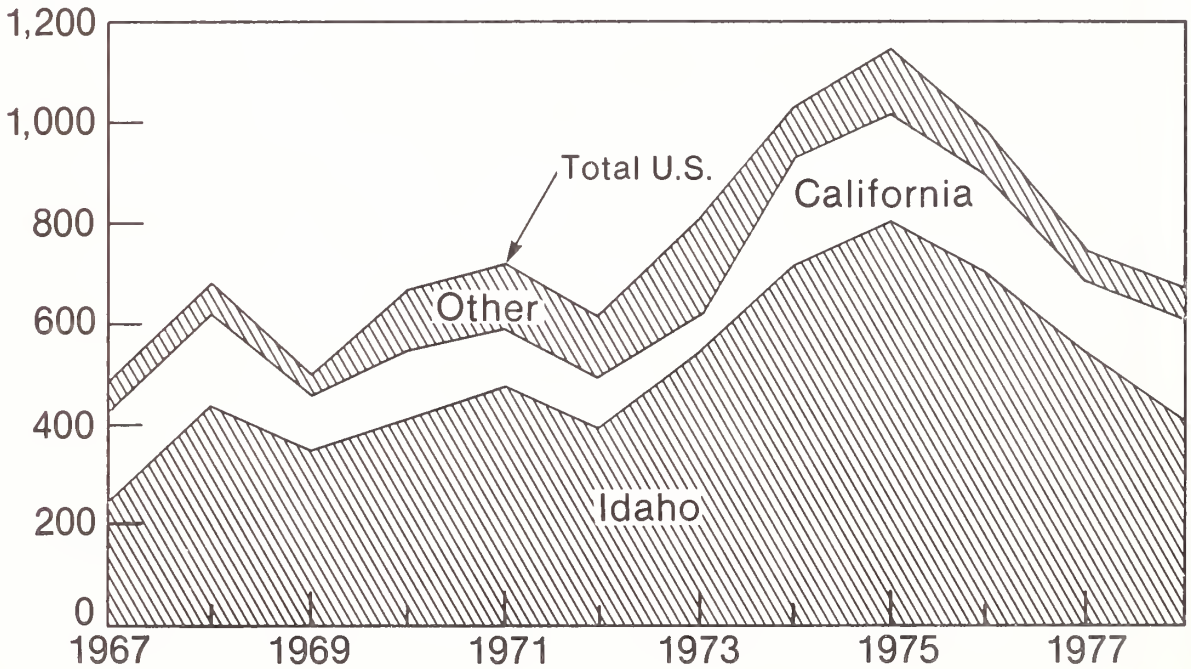


Figure 8

Total U.S. Production of Pink Beans, by State, 1967-78

1,000 cwt.



Pink beans are primarily confined to the domestic market though Puerto Rico is a good customer, as well as Brazil on occasion. Pinks are used for both packaging and canning, especially with meat products.

Small Red Beans

About equal amounts of small red beans are produced in Washington and Idaho. U.S. production has been rather stable at just under 400,000 cwt. a year (fig. 9)(appendix tables 26 and 27). Small reds are used for both packaging and canning, especially in chili. There is a small amount exported, primarily to Latin American countries and Iran.

Small White Beans

Small white bean production averages over 360,000 cwt. a year (fig. 10). California produces the greatest share, with an average of 320,000 cwt. or 87 percent, though production has been declining at an average of 21,590 cwt. a year (appendix tables 28, 29, and 30). Washington, on the other hand, has been increasing small white production by about 5,000 cwt. yearly. Total U.S. production of small whites was only 180,000 cwt. in 1978 (fig. 10).

Small whites are used in canning and are often substituted for navy beans, especially when price differentials provide the incentive. Because small whites are produced in the arid West, they have both a lower moisture content and a built-in transportation advantage for western canners over the Michigan-produced navy bean. Small whites are preferred by canners of baked beans because they stand up to the brick oven process and are chewier than navies.

Small whites are also exported in small quantities, averaging 67,800 cwt. a year. These exports are very erratic from year to year, as portrayed by a high coefficient of variation. Small whites are exported to Europe, Japan, and Taiwan.

Black Beans

The black turtle soup bean is the only black bean produced in the United States. U.S. average production has been only 200,000 cwt. a year, and is declining steadily by 17,000 cwt. a year (fig. 11)(appendix tables 31, 32, and 33). New York was the only producing area until 1973 when Michigan began production, averaging 58,000 cwt. annually. New York's production has been declining by 24,000 cwt. a year, producing only 75,000 cwt. in 1978.

Over 90 percent of black beans are produced primarily for export. Exports have been declining at the same rate as the production decline, or 17,000 cwt. a year. The primary markets are the Carribean area. Domestically, black beans are primarily sold packaged but some are canned as black bean soups.

Pulses Produced in Only One State

Five classes of pulses are produced in only one State in the United States (appendix tables 34 and 35). California is the sole State producing large lima beans, baby lima beans, blackeyes, and garbanzo beans (fig. 12)(appendix tables 36 and 37). Michigan produces the cranberry bean (fig. 13).

Figure 9

Total U.S. Production of Small Red Beans, by State, 1967-78

1,000 cwt.

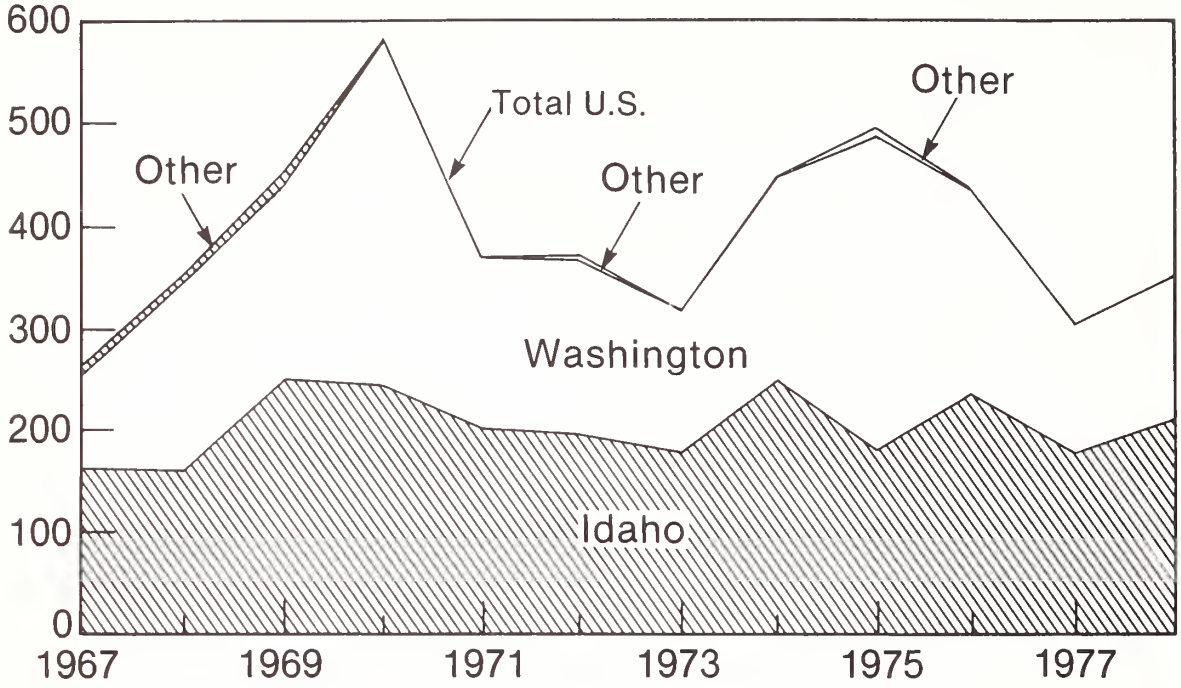


Figure 10

Total U.S. Production of Small White Beans, by State, 1967-78

1,000 cwt.

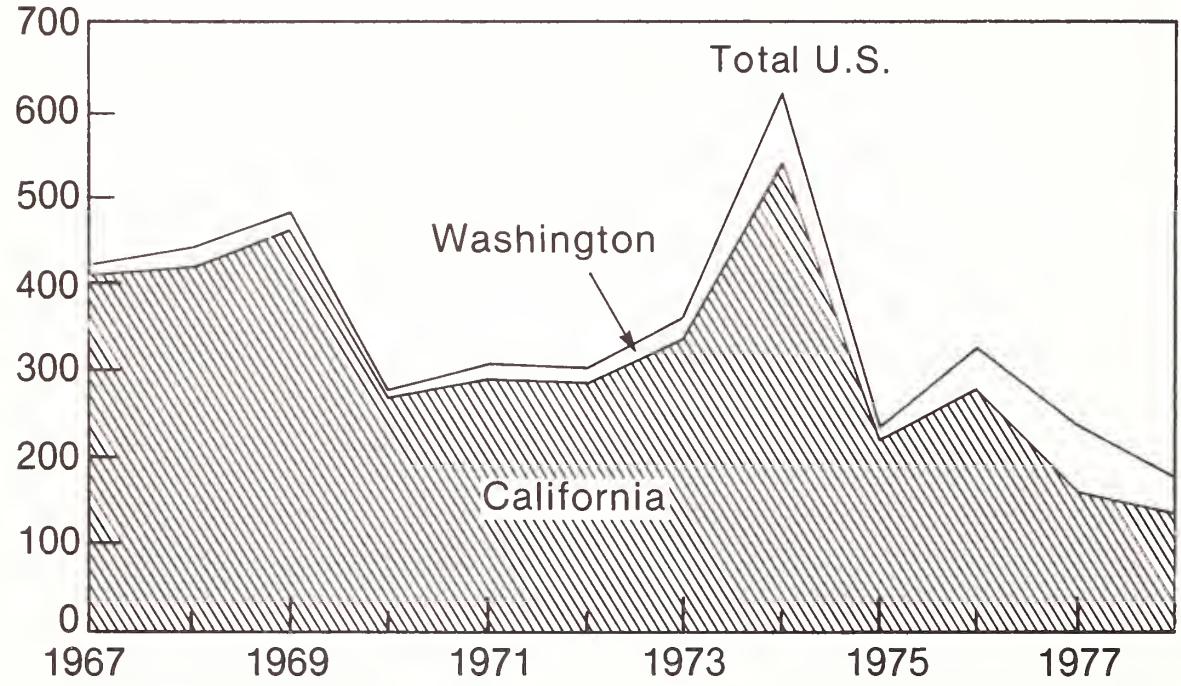


Figure 11

Total U.S Production of Black Turtle Beans, by State, 1967-78

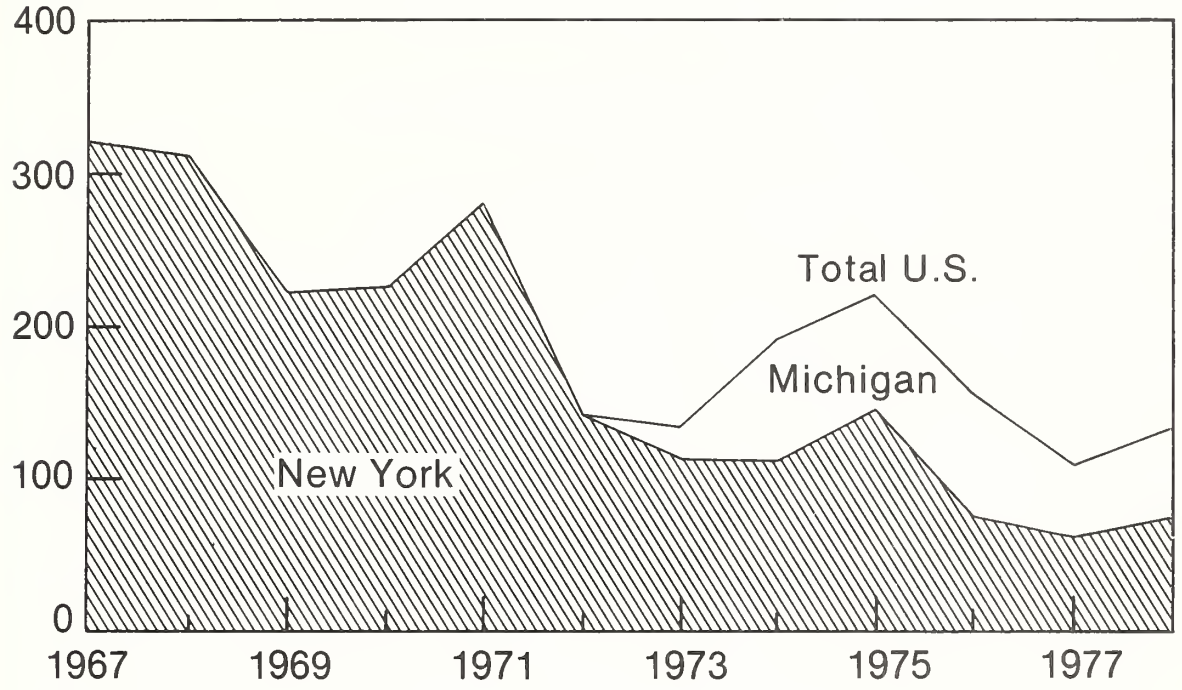


Figure 12

Dry Edible Beans Produced Only in California, by Class, 1967-78

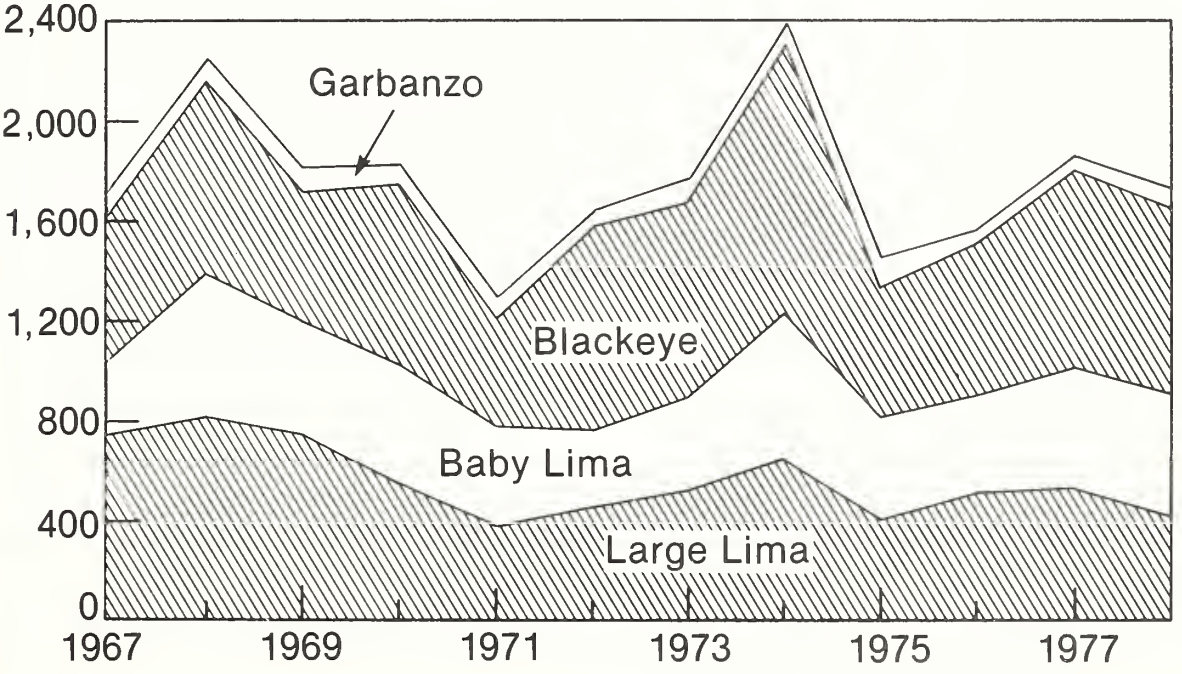
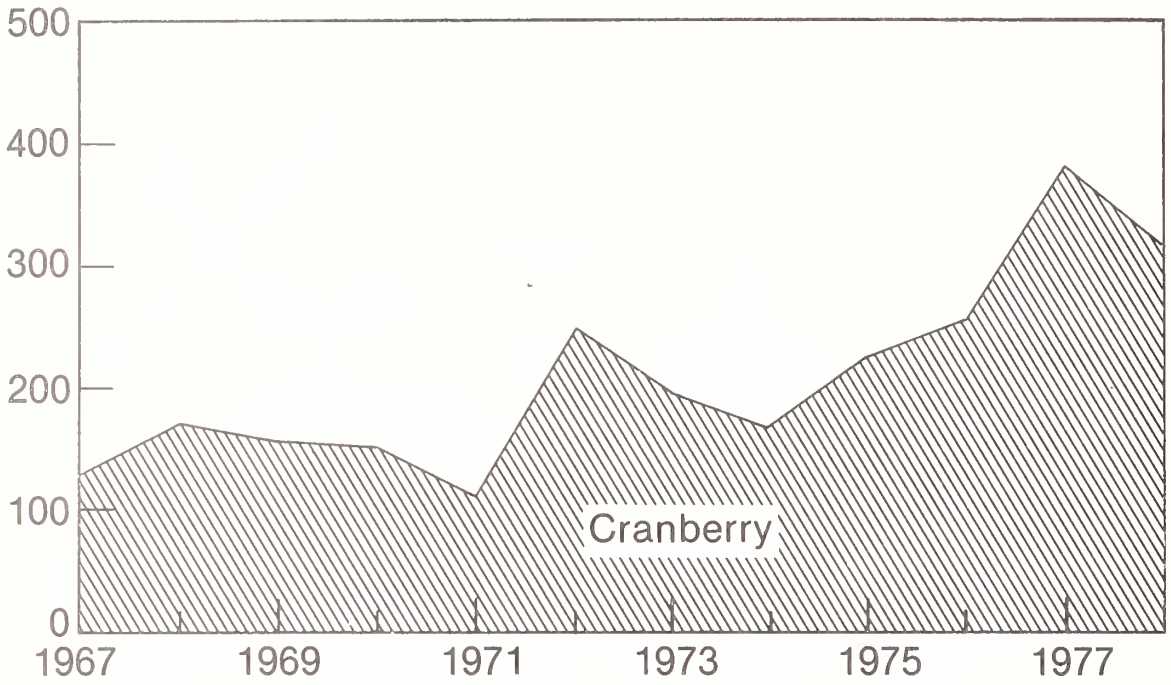


Figure 13

Dry Edible Beans Produced Only in Michigan, by Class, 1967-78



Average production of the large lima bean has been about 575,000 cwt. a year, declining at a yearly rate of 27,800 cwt. Exports have traditionally been about 10 percent of the crop (59,000 cwt.) but have been declining at a rate of 11,000 cwt. a year.

Baby lima bean production has been rather stable at 434,000 cwt. a year. Exports account for about a third of the production or 147,000 cwt., but are highly variable between years.

Domestically, lima beans, both large and baby, are sold mainly in dry form, although some are canned in their natural juices. Limas are exported primarily to Japan. 2/

Blackeye production has been rather stable with an average production of 690,000 cwt. Blackeyes are sold both packaged dry and canned in their own juices. Separate export figures for blackeyes were first recorded in 1977, when over 94,000 cwt. were exported.

Garbanzo production has been averaging about 80,000 cwt. a year. Because the United States does not produce sufficient quantities, the Nation imports garbanzos, mainly from Mexico.

Cranberry bean production in Michigan averages 211,000 cwt. yearly. Production has been trending upward at a rate of about 18,000 cwt. a year. Cranberries are sold domestically in packaged form with some exports to Europe.

2/ Most pulses shipped to Japan are low value splits and culls, since they are processed into pastes. Export statistics do not account for this quality difference.

Organization of the U.S. pulse marketing system has changed considerably since World War II. These changes were brought about to a large extent by the improved technologies of farming, transportation, and communication, and the changing demands of the marketplace. Some of the trends which have evolved, especially the vertical integration of firms' marketing functions, have important implications for the future organization of the pulse industry.

The last published research on the U.S. pulse industry was a description of the marketing system in 1949. 3/ Today's industry bears little resemblance to that of 30 years ago.

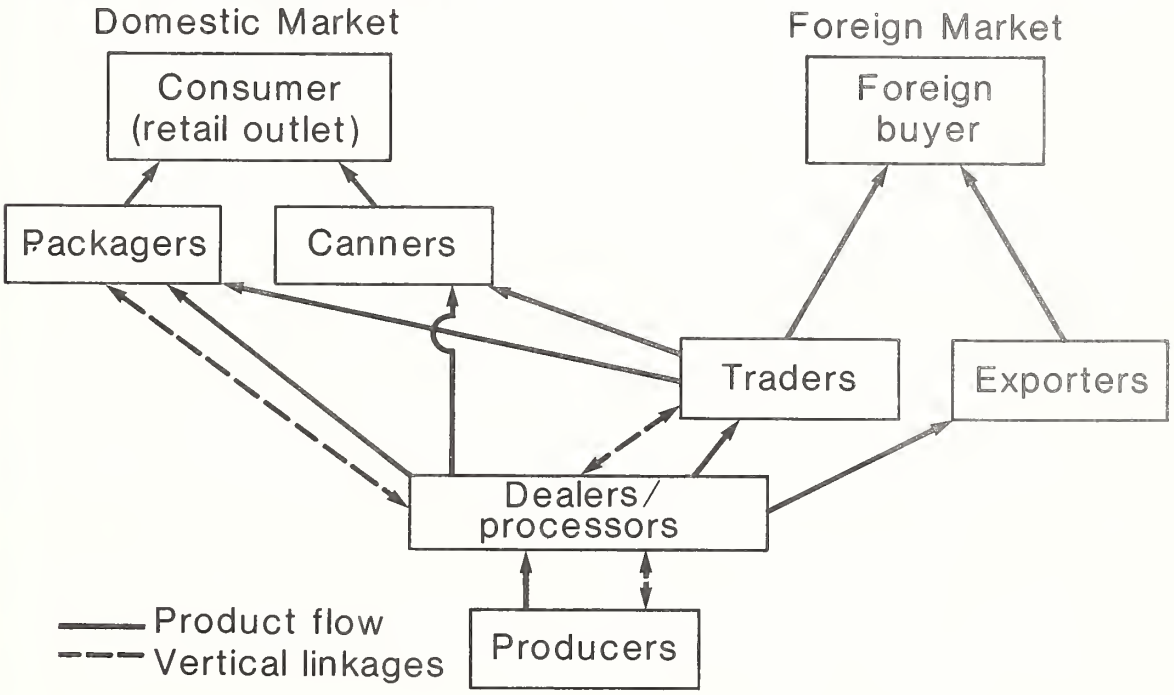
Marketing System: An Overview

Producers deliver their pulses to an elevator (processor) to be cleaned, processed, and stored (fig. 14). Except for the small amount marketed under contract, the producer retains title until time to sell. Processors invariably perform a marketing function by either purchasing on their own account (hence the term dealer), or acting as a broker for the producer.

The pulses can flow to any number of different types of firms from the dealer/processor. They may be sold to a trader, an exporter, a canner, or a packager.

3/ Marketing Dry Edible Beans and Peas. U.S. Department of Agriculture, Technical Bulletin No. 1944, June 1951.

Figure 14
Marketing System of Dry Pulses



Some packagers own elevators and also act as traders. However, most packagers, canners, traders, and exporters depend on a spot market for commodity supply. Traders are distinguished from exporters because the former will sell in any advantageous market. The exporters limit their efforts strictly to the export market. Most often, traders and exporters take title to the pulses and carry running or speculative inventories. Brokers are included under traders as they often take title even though the majority of the business is conducted on a brokerage basis. Traders will also, on occasion, act as a broker and offset sales.

Packagers and canners now service the domestic consumer market. Traders and exporters are the predominant forces in the foreign market.

Final Markets

There are two distinct final markets for dry pulses produced in the United States: domestic and foreign. Less than 10 percent of total U.S. pulse production was exported in 1949, compared to over 30 percent by the late seventies. Changes in the relative shares of the two final markets and the demands of the institutions representing the final markets have induced changes in the marketing system for pulses.

The evolution of the retail food industry in the United States has been toward large self-service grocery stores which are either part of a chain procuring its own supplies or independents relying on cooperative wholesale arrangements. The trend for the chains has been toward private labeling of products while independents use control labels. The difference between these two types of labeling is little more than a matter of semantics. These labeling trends do not, however, preclude placing competing brands on grocery shelves in order to give greater customer choice. Practically all pulses sold in dry form at the retail grocer level today are in packages of 1 and 2 pounds. In 1949, more than half of all pulses sold in dry form at this level were out of bulk bins or 100-pound bags. During that time, a greater proportion of dry peas and lentils were sold in consumer packages. During the emerging consumer package era, the retail/wholesale grocer had to assemble supplies from any number of suppliers. Supplies included both 100-pound bags and consumer packed pulses. A good portion of the packaging was done at the elevator level, thus requiring the grocer to assemble the numerous classes from different sources. In some instances, the wholesale grocers packaged pulses themselves.

Today, the retail/wholesale grocer demands a full line of consumer packaged pulses. This is true for both private and control labeling and the packagers' own brand, since it is too inefficient for grocers to purchase piecemeal. Only in rare instances do wholesalers package themselves.

Even though more pulses are sold in dry form, canned pulses are certainly an important market segment. The canned products have traditionally included beans in tomato sauce (navies), and beans packed in their own juices. In the past 10 years or so, canned beans with meat sauces (such as chili) have grown in popularity. Many canners supply the retail/wholesale grocer a full line of canned products. However, canned pulses make up only a small portion of a canner's product line. In 1949, canned pulses accounted for less than a fourth of canners' business volume. The share of pulses used in canning has not increased in the past 30 years.

Per capita consumption of pulses in the United States has been rather stable at about 7 pounds a year during the past 30 years. Increased pulse consumption in the domestic market appears largely dependent on population growth. With the U.S. birth rate near zero, the population growth, though less than 1 percent per year through 2000, will come from net immigration. However, a large share of legal immigrants

are lower income and will consume more pulses than average, as will low-income illegal aliens who do not show up in official numbers. It does not appear, however, that the domestic market for pulses will expand appreciably in the near future.

The market for pulses has grown in the foreign or export sector. The quantity of pulses exported has increased by nearly 300 percent from 1949. What has evolved from this growth are new market participants and existing ones expanding their market horizons. Two types of firms--traders and exporters--operate in the foreign markets. Exporters, by definition, are concerned entirely with the foreign market and funnel their resources in that direction. Traders deal in opportune markets even though the majority of their business may be in exports.

Both types of firms perform similar export functions. Market information and contact is maintained via agents and in some instances is supplemented by foreign sales offices. The spectrum of the pulse classes offered ranges from a full line of pulses to only one or two classes. The trader/exporter normally operates in a specific geographic area and thus specializes in a certain pulse class. Not all traders deal in the foreign market, as they have neither the capital nor the expertise to assimilate market information and prepare the documents unique to international transactions.

Dealer/Processor

The dealer/processor is the first level in the flow of pulses through the marketing system. As previously mentioned, processing and marketing are performed at this level. More proprietary firms and cooperatives operate at this level than at any other within the system.

The actual processing of pulses includes whatever it takes to prepare field-run pulses for market. Cleaning is an essential stage in all producing areas and is normally accompanied by picking and destoning. In some areas, notably Michigan, New York, and the Red River Valley, the pulses must be dried. Usually, dry peas which enter the markets as splits are mechanically split. Storage is invariably done at this level. Pulses may enter the market in 100-pound bags or bulk, depending on the facilities of the elevator and those of the buyer. Tariffs normally are publicly posted for dealer services, although in some areas posting of charges is incomplete.

Numerous practices are used by the processor to ensure a full supply of pulses. The most prevalent tactics are seed sales and field service. Although there is no explicit contract that producers will deliver their pulses to the elevators who sold them seed, it is a matter of custom and thus an implied agreement. The notable exceptions are formal crop contracts in peas and lentils, and the allowance for payment for seed at the time the producers sell their crop.

When an area experiences a short supply or has an excess processing capacity, a "tare war" normally erupts. Tare is the dockage for foreign matter and/or imperfect pulses which lowers the yield of field-run pulses to market quality. Elevators with high tares will likely lose supply to their competition; hence the term tare war. Negative tares also exist. Such practices imply that no formal standard for determining the actual tare of field-run pulses exists.

The marketing function performed by the dealers is the transaction through which growers sell their pulses. The dealer will either purchase for his own account or act as a broker, offsetting sales. Normal practice is for the grower price to be posted at the elevator and be consistent among an area's elevators. Depending on the producing area, this price may reflect deductions for processing costs (net price), or not (gross price). Certain marketing problems also exist at this level for the

grower. These problems stem from a general lack of market information and market access.

The U.S. Department of Agriculture through its Agricultural Marketing Service publishes weekly grower and FOB dealer prices for the various classes of pulses in the major production areas. This information is not, however, timely enough for a grower to have current information about market conditions. The only current market information is that transmitted via the area's grower price. A saying in the trade is that the best way to get the grower to sell is to lower the offer price. To know what the market is doing requires continual contact with market participants beyond the dealer/processor level. Market access has been a growing concern in some areas. Once a grower's pulses are delivered to the elevator, it is all but impossible to sell them to or through anyone else. 4/ The disincentives are either extremely high processing charges in areas where tariffs are not posted or inability to process the grower's pulses on a timely basis. Because of this restriction on physical flow, the dealers are able to effectively go "off the market" at times and still retain the growers' pulses for later transactions. From the standpoint of the market beyond this first dealer level, there is always a price (market) for pulses.

Dealer/processors buy pulses for their own account and normally carry inventories. It is because dealers will sell their inventories for gain first in rising markets or protect their position in falling markets that they go off the local market. There have even been instances when all of an area's dealers went off the market simultaneously.

Cooperatives operate in nearly all pulse producing areas and act primarily as a dealer/processor, although their share of an area's market is quite varied. Cooperatives in Michigan handle a third of that market and the Southwest Colorado cooperatives a 60-percent share of the pintos produced there. Cooperatives in California have in excess of 50 percent of the large and baby limas, over 40 percent of the garbanzos, and about a fourth of the blackeyes. In contrast, Nebraska has no cooperatives of any significance, Northeast Colorado cooperatives have less than 15 percent of the pintos, and Idaho cooperatives have an 18-percent share of great northerns, 12 percent in both pintos and pinks, 9 percent in small reds, and almost none in kidneys. Except for the California Bean Growers Association, all the cooperatives own their own elevators and thus directly compete with the area's proprietary dealer/processors.

Intermediate Markets

It is a misnomer to speak of an intermediate market for pulses. There are no physical markets in which transactions take place nor any organized futures markets. Between the elevators and the procurers for the final markets are numerous paths which the pulses can take. What makes this level in the marketing system a market is the interdependence of the participants.

Official USDA grades for each class of pulse produced domestically are used by the industry as much as possible. However, due to the variable quality of pulses between years and rigidity of the official grades, it is often necessary to use unofficial industry grades. Due to weather conditions, pulses may not officially grade up to USDA standard but are the best produced in that season and are still of good cooking quality. The official USDA grades are not flexible enough for this reason.

4/ The exception would be California where warehousing practices of identity preserved allows for free movement of growers' pulses.

Since standardized grades--both official USDA and unofficial industries--are used, physical inspection is not required for a transaction to take place. Sale of a substandard pulse as a higher grade is unusual. The industry is very efficient in policing such breaches of confidence via tacit market ostracism.

The mode of communication for market information and transactions is the telephone and telex. This allows a firm on the East Coast, for example, to buy in the Pacific Northwest for a European customer. Shopping around is a continual process.

Terms of trade are quite varied. Quantity, date of delivery, and payment terms vary from one transaction to the next. Quantity can range from a hundred to several thousand cwt., either in bags or rail hopper cars. Date of delivery can be immediate, any number of days in the future, or indefinite where the purchaser takes title via a negotiable warehouse receipt and leaves the pulses in storage. Payment terms also vary, depending on the situation and credit considerations.

The exporters and canners procure their pulse supplies in a similar fashion; they are not vertically integrated in the marketing system and depend on a competitive spot market for supplies. These firms are also the major issuers of whatever marketing contracts are available. They purchase for their own account and do not attempt further trade in the intermediate market.

Canners are most important in navy beans. Ninety percent of the navies destined for the domestic market are taken by canners, yet in other classes of pulses they are a relatively minor outlet.

Packagers purchase the most pulses in the domestic market. There are two types of packagers--those whose sales are primarily pulses and those who have diversified into other products. In the first category are firms selling dry pulses and perhaps sugar, rice, or some other similar commodity. The great majority of these firms market on a regional basis. They provide private labeling as well as their own brands.

The second category of packagers are those who are diversified. Besides selling dry pulses, rice, and sugar, they also sell spices, aluminum foil, plastic bag products, charcoal and charcoal lighter, and paper products, thus marketing a broader product mix. Also, diversification in at least one instance is derived from a packager being a subsidiary of a large nonagriculture public corporation. For the most part, these firms do private labeling, but also carry their own brand.

Packagers evolved out of the post World War II era from firms who were agricultural commodity suppliers to wholesale grocers, elevators and dealers who extended into packaging, and wholesale grocers who packaged for themselves. The great majority of the packagers are regional, with only three truly national packagers. The national packagers, who are diversified, have a disproportionately large share of the market.

National packagers have moved toward vertical integration. They own elevators in a number of pulse-producing areas and thus procure at least a portion of their supplies from the producers. Their vertical linkages also allow them to act as traders. They sell in the intermediate spot market and also directly into the foreign market. The growth of these national, vertically integrated packagers comes from the effective internalization of pricing points between the packager-trader-dealer/processor-producer levels and from diversification, which gives these packagers a competitive edge in servicing the final markets.

Traders, as used here, take on many forms and perform many functions. Traders may own elevators in various pulse producing areas, procure for their own account and sell in any opportune market, or perform a brokerage function. Traders who own numerous

elevators (quasi-dealers) procure numerous pulse classes but tend to operate almost entirely within the domestic market. The true traders, who sell in any opportune market, sell all the various classes of pulses and have a large share of the export business. Brokers act to offset sales.

Market Risks

There are inherent risks at all levels of the marketing system for pulses. Taking an inventory position implies risking a price decline. Packagers, canners, traders, exporters, dealers, and growers are all faced with such risks. However, there are different degrees of risk associated with the various market levels.

Canners' risks are probably the lowest of all. First, canned pulses comprise a small portion of their business. The value of the pulses in the canned product is relatively low with respect to the total value of the canned product. It is not likely that canners would get into heavily exposed positions in terms of pulses.

Packagers' risk is diminished by a diversified, full line of pulse products, and for some, other types of diversification. It is unlikely that a packager's positions in the various classes will all go against him at one time. Also in the short run, some of the losses can be passed on to the consumer due to the rather rigid shortrun packager-grocer supply arrangements. Pulses are a rather minor item in most food purchases; thus it would take a substantial price increase in pulses to cover the cost of searching for lower prices. Obviously, those packagers who are diversified into other areas have a lower total firm risk.

Exporter, trader, and dealer/processor risks are greater than those of canners or packagers. The greatest risk lies in prices going against one's position. Exporters and traders tend to deal in a number of different pulse classes which does negate some risk. The dealers, however, normally take positions in the limited number of classes produced in their area. Dealers also face the risks of low production years in which their plants operate at less than capacity. Brokers without positions have the lowest risks. Exporters and traders who export assume the additional risks inherent to international transactions. To all these intermediaries, timely market information carries a premium as it lowers the firm's risk; one can get in or out of a position before the information is industrywide.

Production risks stem from unavoidable natural phenomena such as weather, disease, and insects. Certainly some of these risks have been lowered by improved cultural practices and technology. Growers are also able to minimize some of the production risks by producing more than one crop.

Marketing risks are the most pervasive for growers, based on their often stubborn insistence as to the best time to sell. Except in California and the pea and lentil area, cooperatives act only as buy-sell organizations similar to the dealer/processors. Growers do not have sufficient market information to lower the risks of marketing because they are not privy to complete market information. There is not enough information in week old market quotes or current local offer prices to continually make sound marketing decisions.

Industry Trends

The size of the average pulse farm and firm, and the degree of industry specialization have increased during the past 30 years. The number of pulse growers has declined concurrently with the number of market alternatives. At the packaging level, the number of firms has declined and concentration has increased. The growth

in farm/firm size and increased firm concentration can be associated to a large extent with technical change. There are marketing economies to larger firms in transportation, market information, and merchandising.

As in most other agricultural industries, the number of firms formerly not involved in the pulse industry has increased. Conglomerate investment has been significant at the distribution level but as of yet does not predominate. Product differentiation in the domestic final market has changed. Pulses are sold as undifferentiated commodities up through the intermediate levels. At the packaging and canning level, however, there has been an increase in product differentiation. Certainly the development of branded pulses requires closer coordination among the various levels of the pulse marketing system than do nonbranded pulses.

Vertical integration within the pulse marketing system is a rather new and growing phenomenon. It is both forward (dealers/processors becoming packagers) and backward (packagers procuring directly from the growers). Some of these vertically integrated firms also act as traders selling in the intermediate and foreign markets. Their ability to internalize pricing points gives them a longrun competitive edge over others in the market.

As the retail grocery trade becomes more concentrated, it allows these vertically integrated, national packagers an edge over the smaller regional packagers. It also means that they do not have to depend entirely on spot market transactions for pulse supplies, which translates into a competitive advantage.

The influence of vertically integrated firms in the intermediate market is expected to expand. These firms' ability to procure at least a portion of their supplies directly from the producers dries up a portion of the packager-intermediaries spot market. Exporters and traders who export depend on the spot market for their supplies, but because the vertically integrated firm can bypass this spot market, they have the competitive edge of going directly to the foreign buyer.

If these trends persist, the organization of the pulse marketing system will be strikingly different in the future. An industry where there are very few or no spot markets between the growers and the firms selling into the final markets is possible.

In the interim, domestic packaging is expected to become more concentrated. More firms will vertically integrate back to the grower level, and these firms will become more active in direct exports. Thus, a few firms will be linked from the domestic packaged market and foreign market back to the grower, that is, packagers/exporters.

The pressure on the intermediate firms by the packagers/exporters will require them to move backward to capture supply at the grower level. This will accentuate the demise of the spot markets. From this, the remaining dealer/processors will find their market positions eroding.

The canners are not expected to integrate backward, mostly because pulses comprise only a small fraction of their business. Thus, those areas which cater to this industry, notably Michigan, should not witness great pressures from the vertically integrated firms. This spot market should remain the same as long as the canning industry does not become appreciably more concentrated.

In summary, the future profile of the pulse marketing system should have a smaller number of market participants. Firms will be integrated from the grower to the domestic package market and foreign markets (the packager/exporter). Fewer intermediate firms will be integrated back to the grower level and operate primarily in the foreign markets. The spot markets for most pulses will be very thin (that is, fewer transactions). The notable exception to the changes is the canners and the

specialized areas they service. In markets where vertical integration is predominant there is increasing price volatility and greater potential for price distortion or manipulation in the residual spot market. Pulse producers will find their market positions eroded by limited market access. Price and market information will be distorted and thus unreliable for sound production and marketing decisions. The producers can only lose in an environment of less competition.

POTENTIAL ROLE OF COOPERATIVES

Cooperatives are active as dealer/processors in nearly all pulse-producing areas. Their share of marketing activity at the handler level varies from near zero to over 50 percent, depending on the pulse class and area.

In 1975-76, 47 cooperatives acted as first handlers of pulses, with sales of $78,825,110. Forty-four of these were local cooperative elevators, two of which were centralized with several elevators and one which was centralized with no elevator facilities (table 3). Only 3 of these cooperatives solely marketed pulses, with 41 marketing grain and 3 marketing fruits and vegetables. Cooperatives marketing grain derived only 20 percent of their sales from pulses, while those marketing fruits and vegetables derived 48 percent.

Two of the centralized cooperatives acted as dealers in marketing their producers' pulses. There were also four federated marketing agencies in common who acted to market for local cooperatives. 5/ The combined sales volume derived from pulses for these cooperatives was $73,947,851. Adjusting these figures for intercooperative transfers, this sales volume translates into a 71-percent share of the first handler cooperatives volume. Thus, over two-thirds of cooperative-originated pulses were marketed by six cooperatives.

A common practice among cooperatives is for growers to retain title to their pulses until they decide to sell. The cooperative provides the processing service and finds a market for the grower's crop either directly or often through a marketing agent. Most cooperatives are not allowed to take long or short positions; thus, they are constrained to act as brokers on the majority of their transactions. Growers' pulses are market pooled in California and the Northwest pea and lentil area, but otherwise this is not a normal practice. Another possibility is marketing agreements between cooperatives and their growers which require growers to sell at least a proportion of their crop within specified time spans.

If the pulse cooperatives continue with their current organization and marketing arrangements, they will likely see their market positions eroded. The pulse industry is changing. Cooperatives have to be aware of the industry trends. Too often, cooperatives do not accurately perceive their real competitors; many identify only the obvious competition at the local level. However, the real competition are the firms who lead the industry and force change at advanced levels of the marketing system.

Cooperatives will need to organize along lines which will allow them to countervail the trend in market power. This does not necessarily mean that cooperatives have to be blueprint copies of the packager/exporter for success. Strong cooperative organizations can actually negate the vertical integration force by allowing open spot markets to persist. It may be, however, that cooperatives will have to integrate along the lines of the packager/exporter and compete with them in final markets if they are to be most effective in the marketplace.

5/ A marketing agency in common is a federation of local cooperatives which join together to market their pulses.

There are several steps in the process for cooperatives to countervail the changes in market power in the pulse industry. Each succeeding step should allow the cooperatives a stronger position in the marketplace. These steps are strengthening of present structure, increased use of pooling, merging of cooperatives into a federated marketing agency in common, and full integration into a federated or centralized packager/canner/exporter.

Strengthening of Present Structure

An obvious alternative for pulse marketing cooperatives is for them to maintain and strengthen their present structure. This cooperative structure has provided a useful service to the marketplace and to pulse producers. The very existence of cooperatives implies that they are performing useful functions in the marketplace. That is, cooperatives would not necessarily exist if the proprietary firms were truly competitive. If this were the case, then one would expect that in areas where cooperatives have a substantial piece of the area's pulse supply, the area's dealers would be more competitive for the producers' pulses than in areas where there is little or no cooperative activity.

Dealer/processors perform the two functions of processing and marketing. The dealer's costs of handling, processing, and storing are rather fixed over time. These costs may increase along with the rate of inflation, but due to large initial capital outlay and its rather fixed payback, the increase would be no greater than inflation. Likewise, the marketing function's costs depend on what it costs to sell the pulses, higher in low production years and lower in high production years. Both processing and marketing costs would include a normal rate of return on the owner's equity.

A measure of market efficiency would consider how closely the grower price moved with the FOB dealer price. Consider the following relationship between the growers' and FOB dealer prices.

1) Grower price = (beta x FOB dealer) - Costs

The costs are actual costs incurred by the dealer in performing the processing and marketing functions. Costs would be zero in areas where growers receive a gross price. Beta is interpreted as the change in grower price with a $1 per cwt. change in FOB dealer price. Irrespective of whether the growers' price reflects processing and marketing costs or not, the fewer the market imperfections, the closer the value of beta is to one, a one-to-one relationship.

In order to examine the hypothesis that cooperatives diminish an area's market imperfections and thus improve the competitive environment, two pieces of information are correlated, beta and cooperative's market share (table 4). USDA's Bean Market News weekly quotations for grower and FOB dealer prices for the 1976-77 and 1977-78 crop years were used to estimate the betas. The betas estimated were for Nebraska pintos and great northerns; Northeast Colorado pintos; Idaho pintos; great northerns, small reds, and pinks; and California large limas, baby limas, blackeyes, red kidneys, and pinks. Data used to estimate market shares for the two, four, and six largest proprietary dealers/processors and cooperatives were obtained from each respective State's crop and livestock reporting service.

The high correlation between the cooperatives' market share and the beta means that as that share increases, so does the beta, and the greater the market share of the two, four, and six largest proprietary firms, the lower the beta. Also, the

Table 3--Volume of pulses and other agricultural products handled by local and centralized first handler cooperatives, 1975-76

Product	Number of cooperatives handling	Volume		Percentage of all pulses
		Pulses	Other	
		1,000 dollars		
Fruits and vegetables	3	1,775	1,936	48
Grain	41	54,326	212,961	20
Pulses	3	22,724	0	100
Total	47	78,825	214,897	27

Source: Statistics of Farmer Cooperatives 1975-76, Farmer Cooperative Research Rpt. No. 3, U.S. Department of Agriculture, March 1979.

Table 4--Correlation coefficients, market shares, and price movements 1/

Item	Beta	Cooperative market share	Proprietary firms		
			Two largest	Four largest	Six largest
Beta	1.000	0.653	-0.347	-0.391	-0.39
Cooperative market share		1.000	-.684	-.724	-.759
Proprietary firms:					
Two largest			1.000	.942	.927
Four largest				1.000	.986
Six largest					1.000

1/ All correlation coefficients are significant at the 10-percent level.

greater the cooperative market share, the lower the larger proprietary firms' market share. The following equation was estimated from this data: 6/

$$\text{Beta} = .824 + \underset{(.0006)}{.003} \times (\text{cooperative market share}) \qquad R^2 = .43$$

Although the variation in cooperative market share among classes and areas only explains 43 percent of the variation in the betas, the coefficient .003 is highly significant.

This analysis suggests that as the cooperatives' market presence strengthens in an area at the expense of large proprietary firms, all producers receive, on average, a better price for their pulses. In pulse-producing areas where cooperatives are not operational, producers can expect to receive as little as 82 cents a cwt. per dollar increase in the FOB dealer price. On the other hand, a cooperative market share of 50 percent appears to be sufficient to allow the producers to receive the full dollar increase in the FOB dealer price, a one-to-one relationship. Certainly a first step for cooperatives to obtain equality in the marketplace is to strengthen their present position. The most gain to be made is in those pulse-producing areas where there is little or no cooperative activity, such as northeastern Colorado and western Nebraska.

Pooling

Existing cooperatives must adopt an alternative marketing strategy to strengthen their marketing positions. Growers' pulses can best be marketed through a cooperative pooling arrangement which allows for both a reduction in marketing risks and potentially higher prices for the grower. The cooperative takes on the risks associated with the dealer level. As pointed out earlier, this risk is less than the sum of the individual risk of the grower members and relatively less than any one grower's. This risk reduction is the result of information flow to which growers do not have access. The cooperative acts as a dealer in the intermediate market. Because of the continual contact with the market, this allows more complete and timely market information. The result is a basis for more solid marketing decisions.

Returns to the growers are expected to increase in a pooling marketing system due to improved market information. Having a source of supply, or an inventory or long cash position, gives marketers the ability to take advantage of any new opportunity that arises. Similarly, there are no pressures to make unsound sales because growers wish to liquidate their positions.

The cash flow to the growers under a pooling arrangement can be flexible. Growers can obtain a partial payment for their pulses upon delivery which is based on a percentage of the going market price. The grower can also expect to receive progress payments as the pool is liquidated. Final payments are made when the pool is closed out.

Pooling as a way of doing business has been successful in the few pulse cooperatives which have tried it. The extensive use of cooperative pooling in rice, cotton, and processed fruits and vegetables is testimony of its acceptance and success as a sound marketing practice.

Pooling of growers' pulses is an important step for cooperatives in shoring up their present marketing position.

6/ The value in parentheses is the coefficient's standard error.

Merged Marketing Agency in Common

Seven pulse cooperatives can be classified as marketing agencies in common: Agway, California Bean Growers, Colorado Potato Growers, Inland Empire Seed, Michigan Elevator Exchange, Outwest Bean, and Valley Marketing. California Bean Growers and Inland Empire Seed are the only cooperatives operating marketing pools. This form of cooperative marketing allows a number of elevators to join together as a larger and stronger presence in the marketplace. Economies of size in marketing are also attained.

If trends in the pulse industry persist, it will be advantageous for pulse marketing cooperatives to merge into one strong federated marketing organization. A single organization acting as a trader for the numerous cooperatives is possible. This implies that the organization can market a complete line of pulses, just like their competitors.

The advantage of this federated form of cooperative activity is that it allows cooperatives to gain market power and countervail the power of the few vertically integrated proprietary firms. Acting as a trader of a full line of pulses means that new marketing outlets are more accessible to the cooperatives and longer term marketing strategies can be developed. This organization would sell in the export market and to packagers and canners and thus allow the intermediate spot markets to persist.

Packager/Canner/Exporter

If the cooperative marketing of pulses is to completely countervail the integrated packager/exporter, their organization and marketing practices will have to be along the lines of these competitors.

Certainly the most difficult market to enter in the future will be the domestic market, in both the packaging and canning segments. No cooperatives presently package a full line of pulses for the domestic consumer market. An attempt to organize a federated packaging cooperative in the fifties failed due to the cooperative's inability to merchandise. However, California Bean Growers package limas and blackeyes under their own label and have a strong brand franchise on the east coast. This points to a cooperative's ability to market branded pulses if given appropriate resources and member support.

Although it does not appear that canners will integrate back to the grower level, cooperatives have the potential of moving into this market segment. An existing fruit and vegetable processing cooperative which already cans some pulse items and has a brand franchise for its label could easily increase cooperatives' share in this market segment. Tri-Valley Growers, through its acquired S&W brand label and private labeling contacts, is an example of such a cooperative fruit and vegetable processor.

In order to effectively export pulses, an effort within the abilities of a cooperative, the organization must develop and acquire the special expertise required to function in this arena. Agents, overseas sales offices, and the like will have to be established. Cooperatives must also develop the means of acquiring sound and timely market intelligence and the ability to prepare and understand international transaction documents and the chartering of transportation.

Other Alternatives

Cooperatives have two other alternatives: bargaining and alignment with grain marketing cooperatives.

Bargaining is the process in which a single entity represents a number of market participants and negotiates the terms of trade with buyers. Because of the nature of pulse marketing, it would be extremely difficult to make such longrun arrangements. On the other hand, bargaining could succeed if the single marketing entity acts as a trader. The pitfall is that unless the bargaining association has its own processing facilities or is aligned with cooperative elevators, it will be constrained by inflexibility and delays in shipping pulses. What emerges from such an arrangement is a marketing agency in common.

The combined trading of grains and pulses by cooperatives appears to have good potential. As previously stated, 41 of the 47 first handler cooperatives of pulses also sold grain in 1975-76. Pulses represented only 20 percent of these cooperatives' marketings.

Pulses are predominantly grown in rotation with other crops, especially grains. In the Pacific Northwest, dry peas and lentils are cultivated in rotation with wheat. In Michigan, corn and soybeans rotate with pulses. Cooperatives have been able to handle both pulses and grains due to the similarity in processing and storage requirements of the crops. Pulses can be handled using nearly all the same equipment as grains.

The main advantage to parallel development in cooperative marketing activity is the gain to be made through reduced cost of international transactions. The use of the same foreign sales offices, personnel, and agents for both grains and pulses is compatible. Market information and intelligence could be obtained more efficiently. The major obstacle to such an arrangement is that once the pulses and grains leave the first handlers, they travel completely different paths. Feed grains are used by those who feed livestock and poultry, wheat goes mainly to millers of flour, and soybeans are used by crushers who sell meal for protein additives in feed and oil to be used by food manufactures in the production of vegetable oil and margarine.

Another disadvantage is the relatively low volume of pulses marketed in relation to grains. This also causes a problem with handling and transportation (such as ship chartering) because of the small quantities transacted per sale. Also, it would seem that the large multinational grain traders would be predominant in pulse trading if it were a viable alternative. These traders are not, however, involved in pulses.

Appendix table 1--Major pulse producing States, farm number, acreage, and average acres per farm, 1964 and 1974

State	Farms		Acreage		Average farm size	
	1964	1974	1964	1974	1964	1974
	---- Number ----		--- 1,000 acres ---		---- Acres ----	
Michigan	12,931	6,909	591	473	46	69
Idaho	4,044	3,489	256	317	63	91
California	1,940	1,416	174	192	90	136
Washington	1,651	1,585	176	245	107	155
Colorado	2,318	1,588	167	175	72	110
Nebraska	1,515	1,344	63	100	42	74
New York	2,736	790	92	40	34	51
Wyoming	910	431	46	23	51	53
Montana	338	166	12	9	36	54
North Dakota	606	993	30	104	50	105
Kansas	91	84	6	8	66	95
Oregon	107	0	11	0	103	0
Minnesota	337	931	16	58	48	62
New Mexico	110	0	4	0	36	0
Utah	44	80	10	16	227	200
Total	29,678	20,013	1,654	1,769	56	88

Appendix table 2--Dry field and seed beans harvested for beans, Census of Agriculture years, 1939-74

Year	Farms	Acreage	Production	Yield	Average acreage
	Number	1,000	1,000 cwt.	Lbs/acre	
1939	100,949	1,586	14,200	895	16
1944	76,551	1,899	15,645	824	25
1949	67,475	1,780	19,223	1,080	26
1954	45,732	1,455	17,125	1,177	32
1959	34,628	1,414	19,087	1,350	41
1964	27,131	1,338	17,657	1,319	49
1969	18,787	1,300	17,131	1,318	69
1974	18,063	1,351	18,316	1,356	75

Appendix table 3--Navy bean production and exports, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 2/
		1,000 cwt.		
Production:				
United States	5,498	915	0.17	NA
Michigan	5,319	885	.17	NA
Minnesota	195	138	.71	NA
North Dakota 1/	118	94	.80	53.7
Exports:				
United States	1,270	421	.33	NA

NA = not applicable.
1/ Production from 1974.
2/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 4--Total U.S. production of navy (pea) beans, by State, 1967-78

Year	Michigan	Minnesota	North Dakota	Total
		1,000 cwt.		
1967	4,801	0	0	4,801
1968	5,589	0	0	5,589
1969	7,169	0	0	7,169
1970	5,180	0	0	5,180
1971	5,034	4	0	5,037
1972	6,190	150	0	6,340
1973	4,500	242	0	4,742
1974	6,246	417	46	6,709
1975	3,987	92	61	4,140
1976	4,665	118	63	4,846
1977	4,884	175	150	5,209
1978	5,581	360	270	6,211

Appendix table 5--Total U.S. production and exports of navy beans, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	4,801	762	16
1968	5,589	1,156	21
1969	7,169	1,828	26
1970	5,180	1,536	30
1971	5,037	961	19
1972	6,340	1,849	29
1973	4,742	1,069	23
1974	6,709	1,518	25
1975	4,140	831	20
1976	4,846	788	16
1977	5,209	1,673	32

Appendix table 6--Pinto bean production and exports, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
	1,000 cwt.			
Production:				
United States	5,067	664	0.13	94.4
Colorado	1,714	229	.13	-49.6
Idaho	940	171	.18	28.4
North Dakota	677	349	.52	84.0
Nebraska	554	133	.24	28.9
Wyoming	390	67	.17	-11.4
Minnesota	180	89	.49	20.3
Washington	132	82	.62	13.5
Kansas	146	37	.26	NA
Montana	144	27	.19	NA
Michigan	123	47	.39	NA
Utah	57	24	.42	-4.7
Exports:				
United States	519	363	.7	61.0

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 7--Total U.S. production of pinto beans, by State, 1967-78

Year	Colorado	Idaho	North Dakota	Nebraska	Wyoming	Other 1/	Total
			1,000 cwt.				
1967	1,834	770	204	298	471	486	4,063
1968	2,041	832	266	420	522	646	4,727
1969	1,908	796	293	463	371	680	4,511
1970	1,998	984	389	552	418	1,043	5,384
1971	1,820	960	399	549	379	736	4,843
1972	1,648	1,096	918	578	428	942	5,610
1973	1,537	706	985	451	268	735	4,682
1974	1,555	868	594	622	361	776	4,776
1975	1,798	1,170	1,117	804	389	1,089	6,367
1976	1,663	1,177	1,043	665	390	854	5,792
1977	1,243	785	944	597	316	632	4,517
1978	1,526	1,138	966	652	363	885	5,530

1/ Minnesota, Washington, Kansas, Michigan, Montana, and Utah.

Appendix table 8--Total U.S. production and exports of pinto beans, 1967-77

Year	Production	Exports	Share
	----- 1,000 cwt. -----		Percent
1967	4,063	270	7
1968	4,727	202	4
1969	4,511	552	12
1970	5,384	411	8
1971	4,843	270	6
1972	5,610	558	10
1973	4,682	801	17
1974	4,776	1,468	31
1975	6,367	631	10
1976	5,792	755	13
1977	4,517	458	10

Appendix table 9--Green pea production and export, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
		1,000 cwt.		
Production:				
United States	2,125	700	0.33	NA
Washington	1,141	408	.36	NA
Idaho	975	308	.32	NA
Exports:				
United States	1,098	346	.32	-69.3

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 10--Total U.S. production of dry green peas, by State, 1967-78

Year	Washington	Idaho	Oregon	Total
		1,000 cwt.		
1967	1,037	835	8	1,880
1968	1,116	980	9	2,105
1969	1,511	1,304	20	2,835
1970	1,212	1,341	15	2,568
1971	1,818	1,400	13	3,231
1972	853	702	10	1,565
1973	662	599	5	1,266
1974	1,291	1,226	19	2,536
1975	1,338	899	8	2,245
1976	1,036	739	0	1,775
1977	307	503	0	810
1978	1,514	1,172	0	2,686

Appendix table 11--Total U.S. production and exports of dry green peas, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	1,880	1,061	56
1968	2,105	1,314	62
1969	2,835	1,664	59
1970	2,568	1,178	46
1971	3,231	1,235	38
1972	1,565	1,417	91
1973	1,266	830	66
1974	2,536	1,049	41
1975	2,245	1,034	46
1976	1,775	977	55
1977	810	317	39

Appendix table 12--Yellow pea production and exports, mean, variability, and trends, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
	1,000 cwt.			
Production:				
United States	578	198	0.34	-45.4
Washington	506	227	.45	NA
Idaho	97	44	.45	-9.4
Exports:				
United States	350	96	.27	-16.7

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 13--Total U.S. production of dry yellow peas, by State, 1967-78

Year	Washington	Idaho	Other 1/	Total
		1,000 cwt.		
1967	393	121	169	683
1968	359	125	138	622
1969	527	205	169	901
1970	391	151	205	747
1971	384	80	235	699
1972	338	48	152	538
1973	294	25	80	399
1974	499	109	26	634
1975	399	60	27	486
1976	288	87	0	375
1977	153	60	0	213
1978	586	329	0	915

1/ Oregon, Minnesota, and North Dakota.

Appendix table 14--Total U.S. production and exports of dry yellow peas, 1967-77

Year	Production	Exports	Share
	----- 1,000 cwt. -----		Percent
1967	683	358	52
1968	622	370	60
1969	901	384	43
1970	747	411	55
1971	699	497	71
1972	538	430	80
1973	399	257	64
1974	634	359	57
1975	486	391	81
1976	375	230	61
1977	213	167	78

Appendix table 15--Lentil production and exports, mean, variability, and trend, 1967-78

Year	Mean	Standard deviation	Coefficient of variation	Trend 1/
		1,000 cwt.		
Production:				
United States	889	292	0.33	NA
Washington	668	226	.34	NA
Idaho	221	75	.34	NA
Exports:				
United States	636	216	.34	NA

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 16--Total U.S. production of lentils, by State, 1967-78

Year	Washington	Idaho	Total
		1,000 cwt.	
1967	462	178	640
1968	513	166	679
1969	605	193	798
1970	519	218	737
1971	703	240	943
1972	824	216	1,040
1973	672	192	864
1974	732	213	945
1975	1,025	300	1,325
1976	813	248	1,061
1977	207	91	298
1978	944	396	1,340

Appendix table 17--Production and exports of lentils, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	640	539	84
1968	679	471	69
1969	798	627	79
1970	737	593	81
1971	943	735	78
1972	1,040	817	79
1973	864	458	53
1974	945	848	90
1975	1,325	937	71
1976	1,061	778	73
1977	298	189	63

Appendix table 18--Great northern bean production and exports, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
	1,000 cwt.			
Production:				
United States	1,645	205	0.13	NA
Nebraska	1,147	143	.13	NA
Idaho	378	95	.25	16.0
Wyoming	83	31	.37	-7.1
Montana	7	4	.57	-0.7
North Dakota	8	6	.67	NA
Exports:				
United States	567	224	.40	47.4

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 19--Total U.S. production of great northern beans, by State, 1967-78

Year	Nebraska	Idaho	Others 1/	Total
		1,000 cwt.		
1967	978	348	173	1,499
1968	1,020	240	126	1,386
1969	1,239	343	125	1,707
1970	996	292	142	1,430
1971	1,079	324	114	1,517
1972	1,092	321	86	1,499
1973	1,147	509	120	1,776
1974	1,460	527	101	2,088
1975	1,056	313	40	1,409
1976	1,275	420	72	1,767
1977	975	387	76	1,438
1978	1,280	420	70	1,770

1/ Wyoming, Montana, and North Dakota.

Appendix table 20--Total U.S. production and exports of great northern beans, 1967-77

Year	Production	Exports	Share
	----- 1,000 cwt. -----		Percent
1967	1,499	277	19
1968	1,386	332	24
1969	1,707	532	31
1970	1,430	346	24
1971	1,517	617	41
1972	1,499	699	47
1973	1,776	583	33
1974	2,088	808	39
1975	1,409	324	23
1976	1,767	911	52
1977	1,438	804	56

Appendix table 21--Red kidney bean production and exports, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
		1,000 cwt.		
Production:				
United States	1,302	251	0.19	NA
California	504	213	.42	53.2
Michigan	314	74	.24	NA
New York	383	163	.43	-33.1
Idaho	50	30	.60	7.0
Exports:				
United States	163	62	.38	NA

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 22--Total U.S. production of red kidney beans, by State, 1967-78

Year	California	Michigan	New York	Idaho	Other 1/	Total
			1,000 cwt.			
1967	212	263	673	10	0	1,158
1968	306	300	503	15	0	1,124
1969	435	455	618	40	0	1,548
1970	363	456	458	25	0	1,302
1971	377	242	468	41	6	1,134
1972	366	271	128	41	13	819
1973	431	295	224	74	104	1,128
1974	663	295	350	52	150	1,510
1975	596	318	334	45	184	1,477
1976	671	282	268	49	107	1,377
1977	643	230	260	102	50	1,285
1978	980	361	315	101	0	1,757

1/ Minnesota, Illinois, and Indiana.

Appendix table 23--Total U.S. production and exports of red kidney beans, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	1,158	136	12
1968	1,124	68	6
1969	1,548	223	14
1970	1,302	181	14
1971	1,134	179	16
1972	819	111	14
1973	1,128	67	6
1974	1,510	217	14
1975	1,477	155	11
1976	1,377	255	19
1977	1,285	197	15

Appendix table 24--Pink bean production, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
	1,000 cwt.			
Production:				
United States	759	205	0.27	33.9
Idaho	505	167	.33	28.4
California	156	44	.28	NA
Washington	49	15	.31	NA
Nebraska	45	19	.42	-6.1

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 25--Total U.S. production of pink beans, by State, 1967-78

Year	Idaho	California	Other 1/	Total
		1,000 cwt.		
1967	250	175	57	482
1968	440	180	62	682
1969	348	113	39	500
1970	409	145	114	668
1971	475	119	130	724
1972	399	108	117	624
1973	545	78	181	804
1974	727	202	101	1,030
1975	809	206	139	1,154
1976	705	193	92	990
1977	542	144	67	753
1978	415	202	65	682

1/ Washington, Nebraska, Minnesota, and North Dakota.

Appendix table 26--Small red bean production, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
		1,000 cwt.		
Production:				
United States	396	90	0.23	NA
Idaho	207	33	.16	NA
Washington	187	72	.39	NA

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 27--Total U.S. production of small red beans, by State, 1967-78

Year	Idaho	Washington	Other 1/	Total
		1,000 cwt.		
1967	165	92	5	262
1968	161	188	5	354
1969	252	190	11	453
1970	246	339	0	585
1971	204	167	0	371
1972	199	171	1	371
1973	179	139	0	318
1974	250	198	0	448
1975	182	308	4	494
1976	240	197	0	437
1977	189	116	0	305
1978	213	140	0	353

1/ Minnesota and California.

Appendix table 28--Small white bean production and exports, mean, variability, and trend, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
		1,000 cwt.		
Production:				
United States	366	118	0.32	NA
California	319	123	.39	-21.5
Washington	32	26	.81	4.7
Exports:				
United States	67	33	.49	NA

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 29--Total U.S. production of small white beans, by State, 1967-78

Year	California	Washington	Total
		1,000 cwt.	
1967	414	9	423
1968	422	19	441
1969	464	23	487
1970	270	5	275
1971	291	18	309
1972	287	15	302
1973	338	22	360
1974	542	79	621
1975	220	17	237
1976	280	49	329
1977	160	79	239
1978	136	43	179

Appendix table 30--Total U.S. production and exports of small white beans, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	423	70	17
1968	441	73	17
1969	487	123	25
1970	275	45	16
1971	309	57	19
1972	302	41	14
1973	360	133	37
1974	621	45	7
1975	237	33	14
1976	329	40	12
1977	239	72	30

Appendix table 31--Black turtle bean production and exports, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
		1,000 cwt.		
Production:				
United States	202	74	0.37	-17.3
New York	175	95	.54	-24.0
Michigan 2/	58	24	.41	NA
Exports:				
United States	186	96	.52	-17.7

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.
2/ Production from 1973.

Appendix table 32--Total U.S. production of black turtle beans, by State, 1967-78

Year	New York	Michigan	Total
		1,000 cwt.	
1967	321	0	321
1968	314	0	314
1969	223	0	223
1970	227	0	227
1971	279	0	279
1972	144	0	144
1973	115	18	133
1974	111	81	192
1975	146	66	212
1976	77	80	157
1977	62	47	109
1978	75	57	132

Appendix table 33--Total U.S. production and exports of black turtle beans, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	321	241	75
1968	314	210	67
1969	223	367	165
1970	227	245	108
1971	279	140	50
1972	144	236	164
1973	133	138	104
1974	192	91	47
1975	212	66	31
1976	157	257	164
1977	109	56	51

Appendix table 34--Production and exports of dry beans produced in only one area, by State, statistics, 1967-78

Origin	Mean	Standard deviation	Coefficient of variation	Trend 1/
	1,000 cwt.			
Calfiornia:				
Large lima:				
Production	574	148	0.26	-27.3
Exports	59	58	.98	-11.0
Baby lima:				
Production	434	93	.21	NA
Exports	147	78	.53	NA
Blackeye production	691	184	.27	NA
Garbanzo production	79	21	.27	NA
Michigan:				
Cranberry production	211	82	.39	17.9

NA = not applicable.
1/ All applicable trends are significant at a 95-percent confidence level.

Appendix table 35--Total U.S. production of beans produced in only one area, by State, by class, 1967-78

Year	California				Michigan cranberry
	Large lima	Baby lima	Blackeye	Garbanzo	
	1,000 cwt.				
1967	774	280	565	88	129
1968	814	589	781	58	178
1969	770	430	513	101	160
1970	558	478	712	68	155
1971	398	400	413	85	109
1972	471	317	801	60	249
1973	533	378	766	98	194
1974	670	574	1,092	83	165
1975	408	416	499	119	222
1976	522	378	607	46	257
1977	540	475	800	63	390
1978	434	489	745	80	319

Appendix table 36--Total U.S. production and exports of baby lima beans, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	280	39	25
1968	589	154	26
1969	430	145	34
1970	478	265	55
1971	400	120	30
1972	317	121	38
1973	378	63	17
1974	574	145	25
1975	416	82	20
1976	378	203	54
1977	475	284	60

Appendix table 37--Total U.S. production and exports of large lima beans, 1967-77

Year	Production	Exports	Share
	1,000 cwt.		Percent
1967	774	38	5
1968	814	211	26
1969	770	121	16
1970	558	51	9
1971	398	57	14
1972	471	41	9
1973	533	40	8
1974	670	29	4
1975	408	17	4
1976	522	38	7
1977	540	9	2

*U.S. GOVERNMENT PRINTING OFFICE: 1980-0-310-945/ESCS-84

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

POSTAGE AND FEES PAID
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AGRICULTURE
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